The Builder.

VOL. LXI. No. 2514 SATURDAY, APRIL 11, 1891.

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The Disposal of Sewage from Isolated Buildings.

*II.**

WE will now give a few practical hints on the construction and mode of operation of some of the principal processes. A little consideration may first be given to one or two points, which are largely the same in all processes.

And first, as to storm-water. In the case of a new building, where the separate system of drainage is wholly or in great part adopted, little or no difficulty will be experienced in dealing with the rainfall, however great it be. It is conveyed straight to the river. But in the case of an old building, with only one system of drains, the outfall-works will often be overtaxed, and special preparation must be made for disposing of excessive rain.

A moment's consideration will reveal the difficulty. The mansion mentioned in our last article would, with its out-buildings, yards, and entrance-lodge, but exclusive of gardens and grass-plats, occupy an area of not less than 1,000 square yards. An inch of rainfall on this surface represents a total fall of nearly 4,700 gallons, and even if only two-thirds of this finds its way into the drains, it means that a volume of water more than six times the volume of the sewage, has to be treated at the outfall. To construct tanks large enough to contain such a quantity, would be a waste of money. But some provision must be made, or a chemical process will be for a time deranged; and, in the case of a land-treatment, the vegetables or other produce will be flooded and so damaged.

Several methods may be adopted for diverting the storm-water. One is the clever but simple arrangement shown in the adjoining diagram. The ordinary sewage, flowing at a moderate velocity along the drain A, falls into the pipe marked B, which conveys the sewage to the proper outfall, but the increased volume of water caused by a storm flows at a greater velocity, leaps over the weir at C, and escapes by the storm-pipe D. Full particulars of this arrangement for various gradients will be found in Latham's "Sanitary Engineering."

Another method is to allow the water to enter the tank as usual, and to arrange the tanks (which are always in duplicate) so that, when one is full, the sewage can overflow into the other; if both are filled, the sewage

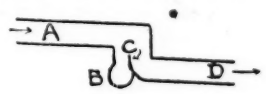


Figure 1.

overflows into a special storm-water channel. This arrangement is shown in Fig. 2, hereafter described. This method, of course, cannot be adopted in those cases where the tanks as soon as full are discharged automatically by syphons. In this event, the sewage is received in a small chamber from which it passes usually into one or other of the tanks; a storm-outflow is provided, a little above the ordinary sluices or openings, and when the drain is delivering a large volume of water, a considerable portion of it finds its way out of the chamber by this storm-channel.

In town-works, beds of osiers are frequently formed, and the storm-water is diverted into them. The osiers retard the flow of the water, and so assist in the deposition of the solids contained in it. Besides this, the osiers are rank feeders, and will not be at all damaged by having the lower part of their stems flooded for several days. These osier-beds ought not to have underdrains, as these would soon become choked by the long osier-roots.

Such beds offer, perhaps, the best means of treating the storm-water arising from isolated buildings which have only one system of drains, but where the separate system is adopted, as we propose here, they are not absolutely necessary, although they may on occasion prove useful.

A word or two about screening-tanks. In treating town-sewage, these are quite necessary; the number of pieces of wood, cork, rags, and other articles, which reach the outfall, is considerable, and as such things would be a source of annoyance, both in tanks and gutters, they are extracted from the sewage before any other treatment is attempted. The channels, by which these solids reach the drains, are the ventilating manhole-covers (the dirt-boxes under these being often full to overflowing), street-gullies, untrapped openings, dishes without grates, and even trapped openings. In a large town, there must necessarily be a number of such imperfections existing. In a new isolated building, however, we may well assume that the drainage has been carefully executed, that traps and grates are perfect, and therefore that the number of solids arriving at the outfall will be reduced to a minimum. Leaves may be excluded from the rain-water pipes, by means of roses placed in the heads.

We do not think, therefore, that screening is necessary for the sewage of small isolated buildings, especially if rain-water be in the main excluded. But for large buildings it may prove useful. There are several ways of accomplishing the object, perhaps the simplest being the suspension of a perforated iron pail in a small chamber adjoining the tanks; all the sewage flows into this pail, the solids being retained therein, and the liquid passing forward into the tank. Where fall cannot be obtained for this method, a vertical strainer, made of wire in an iron frame, may be placed across the small chamber. Sometimes a separate strainer is provided for each tank. The refuse collected by the strainer or in the pail should be dug into the ground, or covered with soil until required for garden purposes.

Another point to be considered is the necessity of storage tanks. These are, of course, an absolute necessity in all chemical processes, whether applied to the sewage of towns or of isolated buildings (Conder's iron process claims to purify sewage without the necessity of tanks, but of this we will speak hereafter). In treating large quantities of sewage, either by irrigation or filtration, however, storage tanks are not necessary, unless pumping must be resorted to. But the small amount of sewage arising from an isolated building, or even from a village, cannot well be treated by land without first being stored. The reason for this is that the sewage arrives at the outfall in such a small stream that, if allowed to flow at once upon the land, it would be absorbed within a few yards of the outfall, and this portion of the gutters would be overtaxed, while the remainder would not, per-

* See *ante*, p. 259

Figure 2.

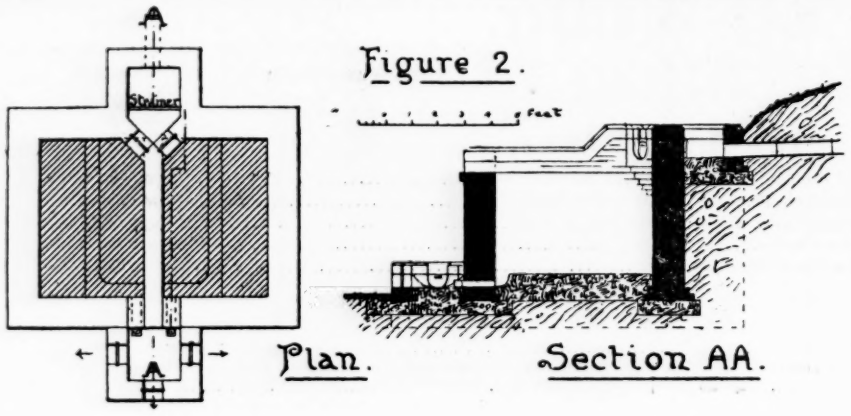
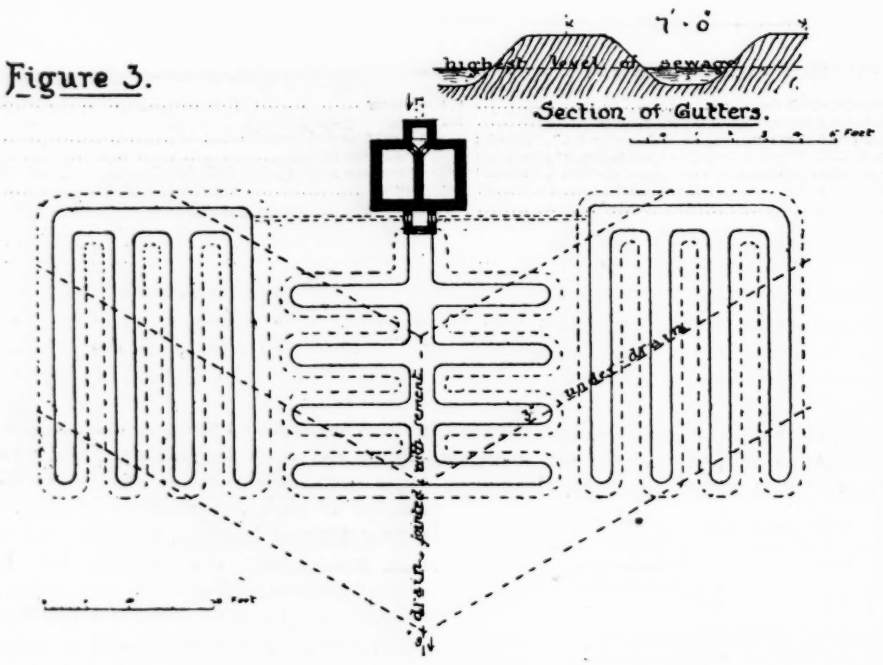


Figure 3.



haps, have been used at all. If the sewage be collected and discharged, say, once a day, every part of the gutters may be put into operation, the whole of the plants on the ground will be nourished, and a better effluent will be obtained.

A further advantage of storage-tanks is the diminution of smell. The sewage, stored in a tank, and having, therefore, a very small surface exposed to the air, will yield little or no offensive odour, and can be discharged upon the land at any hour of the day, - early morning, probably,—when there will be least danger of annoying the occupants of the building. Sewage continually flowing upon the land will be more likely to prove a nuisance, besides having the disadvantage mentioned in the last paragraph. Storage-tanks are frequently covered with wooden lids, in order to prevent the spread of smell as much as possible.

From this it will be seen that the cost of the various methods of treating the sewage of towns furnishes us with no criterion for estimating the cost of the same processes applied to the sewage of isolated buildings. Land-treatment has, for certain towns, proved remunerative, whereas in all cases chemical treatment involves loss. But for isolated buildings similar tanks are required for both modes of treatment, and practically the same amount of labour will be required daily in actually conducting the treatment. The cost of the precipitant must, of course, be added to the charge for maintenance of chemical processes, but it will be only trifling.

Figure 2 shows the arrangement of tanks for storing the sewage of the mansion previously mentioned. A small straining-chamber also is shown. Each tank will hold 650 gallons,—that is to say, each will hold 150 gallons of rain-water in addition to the maximum daily quantity of sewage,—namely, 500 gallons. An inch of rainfall on the gathering-surface of 78 square yards, neglecting absorption and evaporation, yields, we said, 365 gallons, and, consequently, such a fall will cause one tank to overflow to the extent of 215 gallons; this quantity will, therefore, be treated with the next day's sewage, which, in turn, will overflow to the extent of 65 gallons; and so on, until the normal condition of treatment has been regained.

The amount of rainfall which these tanks can receive, in addition to the sewage, without overflowing into the storm-channel,—assuming one tank only to be emptied each day—is $2\frac{1}{5}$ in. in one day, or rather more than $2\frac{1}{3}$ in. in two days, 3 in three days, or $4\frac{2}{3}$ in. in a week. With so much provision for rainfall, the storm-channel will seldom or never be required.

But where a natural treatment is adopted for the stored sewage, there is no reason why both tanks should not, after a storm, be emptied at the same time, over a somewhat larger area than usual. It will, therefore, be found sufficient in these cases to construct two tanks, each large enough to contain the maximum daily flow of sewage,—*i.e.*, 500 gallons; this will allow the addition of 500 gallons of rain to the sewage in a day, or $1\frac{1}{3}$ in. of rainfall, without causing any overflow into the storm-channel. The two tanks may be emptied together at the usual time, two series of gutters being used instead of one.

It is only when the tank-effluent has to be passed through prepared filters of limited area, that the quantity discharged each day must be kept within reasonable bounds, as, for instance, in the International process.

The tanks for chemical treatment ought, therefore, to be of the size shown in the figure. For another reason, each tank ought to be capable of taking an ordinary rainfall without overflowing, and that is because the precipitant is, as a rule, more active if the sewage with which it is mixed is absolutely still, and the overflowing of one tank into the other will therefore prevent, to some extent, the proper precipitation of the solids.

Very often the tanks are discharged automatically by means of a syphon, and of course this method has obvious advantages, but it is only applicable to sewage simply stored preparatory to land-treatment. It cannot be adopted for chemically-treated sewage, and it has this disadvantage for land-treatment,—the sewage will be discharged at varying hours of the day, and may often prove a nuisance to those occupants of the mansion who may be wandering in the vicinity of the tanks; whereas, if the tanks were discharged at a certain time every day, say, early morning, before the occupants of the mansion were astir, no nuisance could possibly arise. For this reason, a valve in charge of an attendant is a better though more troublesome arrangement.

The work involved in laying out part of an estate to receive by broad irrigation a small quantity of sewage, such as that from the mansion before-mentioned, may be very little; in fact, simple furrows, made with the spade or plough, may be all that is required. In most cases, however, the land must be under-drained 4 ft. deep or more, and the principal carrier is usually formed with socketed stoneware or concrete channels. From the main carrier the sewage can be turned by means of sluices to flow into any of the branch carriers, which are usually simple furrows about 9 in. deep and nearly the same width. These furrows may be ten or fifteen yards apart, and on gently-sloping ground they may be cut nearly in the direction of the greatest fall, provided that the gradient of the furrow does not exceed 1 in 20. At intervals along the furrows small movable stops of wood or sheet iron or slate are fixed by the attendant to check the flow of the sewage, and, in fact, transform the gutter into a series of long narrow pools. By this means the sewage is given full opportunity of spreading laterally among the roots of the herbage.

On steep ground, the furrows are cut to follow nearly the natural configuration of the surface, having, however, a small inclination, say, 1 in 300. When the uppermost carrier is filled, the sewage overflows the lip of the carrier and spreads down the slope, until it reaches the next one, and so on. Arrangements are made, however, for turning the sewage into any of the lower carriers or grips, so that the upper portion of the irrigated land may have rest and be re-oxygenated. Stops are placed where necessary, as in the ridge and furrow system. The arrangement just described for steep ground is known as the contour or catchwater system.

On flat ground, great care must be taken to prevent the accumulation of the sewage in ponds; this can best be effected by forming the ground between each pair of furrows with a convex surface, similar to the surface of a road.

The furrows stop short of the pick-up carrier, which runs along the bottom of the irrigated plot,—sometimes even 50 yards from it,—so that the sewage has a considerable distance to spread before it reaches the carrier. For small quantities of sewage, and also for light soils, the pick-up carrier may be dispensed with, the under-drains being sufficient to take all the moisture not absorbed or evaporated.

In light sandy soils, it will be found necessary to form the carriers with turf, as otherwise the flow of the sewage will wear away the sides and so destroy the carriers.

The underdrains are sometimes two-inch, but more frequently three-inch agricultural drain-pipes, carefully laid with uniform fall, and connected with larger mains according to the size of the irrigated area and the quantity of sewage poured upon it. Their distance apart varies according to the nature of the soil.

The irrigated land may be utilised for growing rye-grass, turnips, wheat, and, in fact, nearly everything which farmers and market-gardeners cultivate. It is sometimes used as a pasture for cattle; part of the Croydon sewage-farm is let to a dairyman.

But the cattle ought not to have access to any portion of land actually under irrigation, and not indeed to any portion until some days have elapsed since it has been treated with sewage.

The flat-bed system of irrigation is not now recommended. In this system the land was divided into a series of level beds, each surrounded by a low bank of turf; into this tray-like space the sewage was turned, and there it was allowed to settle, the effluent passing off by under-drains 5 ft. or 6 ft. deep.

Intermittent-filtration works require greater preparation, but about four-fifths, or nine-tenths, less ground than broad-irrigation works. The ground must be deeply underdrained, certainly not less than 5 ft., deep, and preferably more; sometimes the underdrains are 7 ft., and even 9 ft. deep. If there be too little earth above the drains the effluent will be impure, on account of the small thickness of the filtering medium; and the sewage may even percolate to the drains so quickly as to carry with it large quantities of sand and soil, and so tend to destroy the ridges and furrows. The under-drains may be as described for irrigated land, but closer together,—that is to say, from five to ten yards apart. Care must be taken that the under-drains run across the gutters, and not immediately under them in the same direction.

The surface of the ground is laid out into ridges and gutters, usually 6 ft. or 7 ft. from centre to centre, the gutters being about 1 ft. 6 in. deep. The best arrangement of gutters is one with a main gutter, from which shallower ones branch at right angles; the maximum depth of sewage in the main gutter is about 9 in., and in the branches 6 in. The chief deposit of silt or sludge takes place in the main gutter, and when this is sufficiently dry it must be lifted and dug into the ridges.

As before stated, at least two, and preferably four or five sets of gutters must be formed, so that the necessary intermittency of action can be insured.

On steep ground it will be necessary to form a series of terraces, so that each system of gutters may be level.

The ridges may be planted with cabbages, turnips, potatoes, and other market-garden produce, including even strawberries; in fact, the filtration area may be the kitchen-garden of the house.

Fig. 3 shows a scheme of intermittent filtration, for treating the sewage of the mansion before mentioned. The ground measures 13 perches, and is laid out in three beds. The under-drains are from 6 ft. to 7 ft. deep, and 5 yds. apart. Each bed has an area of about 130 square yards, and each filtering medium, reckoning it to be 2 yds. in depth, contains, therefore, 260 cubic yards. This has to receive in one day 500 gallons of sewage, or nearly two gallons per cubic yard. On a rainy day, it will receive from the tank 650 gallons, or two-and-a-half gallons per cubic yard, and, in addition to this, it will receive the actual rainfall on its own surface, which, if we assume 1 in. as the largest fall to be provided for, will be four gallons and three-quarters on each square yard, or nearly two-and-a-half for each cubic yard. This will give a total of very nearly five gallons per cubic yard as the maximum daily quantity which the area will be required to purify; the average daily quantity, however, will not reach three gallons per cubic yard. It is usually said that a cubic yard of suitable porous soil will satisfactorily purify five gallons of sewage in a day; consequently the filtration beds shown in the figure, err, if at all, on the safe side.

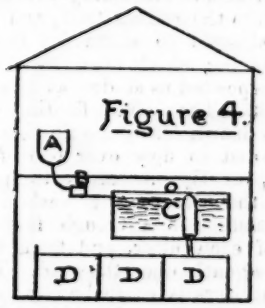
It will be seen that the sewage, on being discharged from either of the tanks, enters the small sluice-pit, from which it can be turned by sluices to flow into any one of the three beds. On steep ground it might be necessary to place the tanks at the highest corner of the plot, and to convey the sewage from the sluice-pit to the different series of gutters, in drain-pipes or stoneware channels.

Sometimes osier-beds are formed to receive the whole of the sewage of an isolated building or even of a village, and this mode of treatment achieves good results economically. Under-drains, as before stated, must not be laid in osier-beds, but in place of them each bed must be separated from the adjoining beds by deep ditches, into which the liquid portion of the sewage can percolate, and by which it can be carried to the nearest stream, or to a line of pipes communicating with the stream. The surface of the ground may be laid out in various ways; sometimes ridges and gutters, similar to those used in intermittent filtration, are adopted; and at other times the surface of the bed is level, and surrounded by a rim of turf a few inches high, as in the flat-bed system of irrigation. Intermittency of action is as necessary for this as for any other method of land-treatment.

Until quite recent years, no other than land-treatment has been advocated,—at any rate with any success, for isolated buildings. If sufficient land has not been available for the surface-disposal of the sewage of such a building, two alternatives only remained,—sub-irrigation and cess-pools. The latter ought only to be used as the very last resource, and the former mode of treatment, although it has been adopted in several instances in close proximity to buildings, is not a very good method. The drains by which the sewage is passed under the ground become choked with filth in a year or two, and must be opened out in places, so that the whole can be cleaned by passing canes or other implements through them from opening to opening; and this certainly is not a very savoury procedure.

Nowadays, however, there are at least two chemical processes, which have been adopted for isolated buildings with manifest success; these are the International Process and Conder's Iron Process. The whole process of purification differs in these two methods, from the application and action of the precipitant to the completion of the treatment. It will therefore be necessary to describe both somewhat in detail.

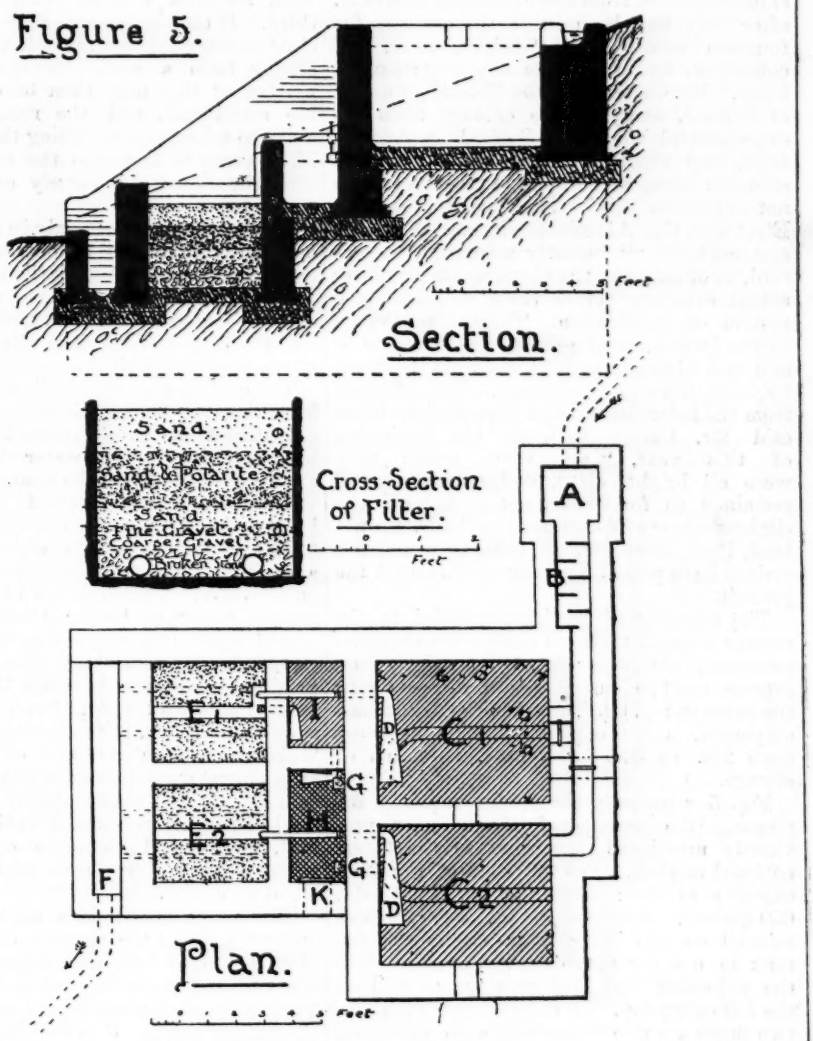
Of course, other modes of chemical treatment have been tried in connexion with isolated buildings, but these two possess several advantages, which render them more uniformly suitable for such structures. The system in use at the Lodge Moor Small-pox Hospital, Sheffield, may perhaps be mentioned. See fig. 4. In the large copper at A, a quantity of permanganate of potash is dissolved, and the solution feeds the two-gallon closed cistern at B; the sewage enters the large tank at C, and when this is nearly full, the contents of the small cistern are discharged automatically into the tank and disinfect the sewage therein; the large tank is then emptied by means of an automatic syphon, into the tanks marked



D, from which the effluent goes to irrigate adjoining land. The A B C process has been used at Wellington College. Other processes also have been tried, but none with any great success.

The International process of sewage purification was first brought into notice at Acton in 1887, and has rapidly grown in public estimation. A number of towns, both large and small, have adopted the system; it is also in use at Parkhurst Convict Prison, Isle of Wight, at Powis Castle, Welshpool, at Larbert Lunatic Asylum, Stirling, and at other places. The purity of the effluent has won high commendation. Sir Henry E.

Figure 5.



Roscoe, in August, 1888, reported that the effluent passing from the filter-beds at Acton; after they had been in continuous use for fourteen months, was "bright, clear, and colourless, and free from any objectionable smell." Mr. Carter Bell, the Borough Analyst of Salford, analysed the effluent from the experimental works at Salford in August, 1890, and reported, "This is a first-class effluent; many well-waters in the country are not so pure as this." The International, the Electrical, the Aluminoferric, and the Barry systems have all recently been tried at Salford, in order that the Corporation may have actual evidence before them in selecting a system of purification. The sludge formed by the International process was found to be as 1 to 2·46 in comparison with that produced by using lime as precipitant. The effluents from the International and Electrical systems, said Mr. Carter Bell, at the beginning of this year, "are very good; they were all bright, clear, and colourless, and remained so for weeks, not giving off the slighest odour of decomposition." Dr. Frankland, Prof. Macadam, and other eminent sanitarians have passed high encomiums upon the process.

The quantity of precipitant added to the sewage is smaller than in most other chemical processes, but larger than in Conder's iron process, and the sludge produced is less with the same exception. Ferozone, the precipitant employed, is not expensive, the cost being from 20s. to 30s. for a million gallons of sewage.

Fig. 5 represents the works required for treating the sewage of the mansion previously mentioned, according to the International method. The tanks are of the same capacity as those shown in fig. 2, namely, 650 gallons. As already stated, any excess of rainfall on one day over the capacity of the tank in use for that day will overflow into the adjoining tank, and must be treated on the following day. In conjunction with the two tanks are two filter-beds, each having an area of 1½ square yards, and these, like the tanks, are used on alternate days. A straining-chamber may be formed, when necessary, on the higher side of the mixing-pit at A.

The mode of treatment is as follows:—In the mixing-pit, at A, a perforated hopper of galvanised iron is suspended, and in this a certain quantity of "ferozone," varying from five to eight grains per gallon of sewage, is placed every day. The sewage flows around the hopper, and gradually dissolves and carries away the ferozone: the thorough mixture of the precipitant with the sewage is effected by the baffling-plates at B, past which the compound flows on its way to the tanks C_1 and C_2. By means of sluices, either of the tanks can be made to receive the sewage. When one tank is full, or, rather, at a certain hour every day, whether the tanks be full or not, the incoming sewage is turned to flow into the second tank, and that in the first is allowed to stand for two or three hours, during which time the solid matter will be deposited as sludge at the bottom of the tank. The liquid floating above the sludge is drawn off by the floating arm at D, and allowed to flow over one of the filter-beds, E_1 or E_2; in order to prevent the sand of the filters being washed away, the liquid passes into a trough laid along the centre of each filter, and from this trough overflows gently upon the sand. The effluent from the filters is carried away by the drain, F. When the clarified liquid has been drawn from the tank, the valve at G should be opened, and the semi-fluid sludge conveyed to the pit, H, provided for it.

The solid matter in the sludge in H will gradually settle there, and when the pit is full, the liquid can be drawn off into the small tank at I, and there further treated with ferozone; the liquid arising here will pass by the floating arm on to the filter-bed E_1, and the sludge must be lifted back into the sludge-well H.

The quantity of sludge which may be expected to be deposited from 500 gallons of sewage, is little more than one cubic foot, and by the further settlement in the sludge-well, its bulk will be reduced about one-third. If the sludge-well have a capacity of eight or ten cubic feet, it will hold the sludge arising from a week's sewage; the liquid portion of this may then be drawn off into the small tank, and the remaining sludge must be taken out by lifting the penstock at K, and may be dug into the adjoining land, after the liquid has largely evaporated and drained away.

This arrangement can only be adopted where considerable fall can be obtained. In other cases, the sludge-well and the filter-beds may have to be on the same level, and the liquid arising from the sludge must be pumped back into the large tank or into the outfall sewer above the mixing-pit A.

The cost of a sludge-well may be avoided by taking the sludge directly from the precipitating-tanks into shallow lagoons on the land, and allowing the water rising from the sludge to drain off on the land.

The tanks are formed with concrete bottoms having smooth floated surfaces, laid to fall to central gutters, which should have a somewhat rapid inclination down to the outlet-valve. The walls are of brickwork in cement, and may be faced inside with salt-glazed bricks; in any case, the bricks used should be dense, and as little absorptive as possible. The filter-beds are 3 ft. thick, and are formed with layers of sand, sand and polarite (mixed in equal proportions), gravel, and broken stones, in the last of which 4 in. agricultural drain-pipes are laid to convey the effluent into the outfall-drain. The surface-sand of the filters becomes in time somewhat foul, and should therefore occasionally be raked over, and replaced with clean sand when necessary.

The ferozone, which is used to deodorise and precipitate the sewage, consists mainly of sulphate of iron and magnetic oxide of iron; and the polarite, used in the filter-beds, has for its chief constituents magnetic oxide of iron and silica. It is said that the polarite in the filters is practically everlasting, and merely requires short intervals of rest to keep it thoroughly active. For this reason the filters are in duplicate, each having alternate days of work and recreation. The annual cost of the ferozone required in treating 500 gallons of sewage a day, is about 5s. The polarite costs about 14s. for each square yard of filter-bed: that is to say, in this case two guineas. It will be seen that the cost of the chemicals used in this process is very small, and the treatment, which includes both precipitation and filtration, is carried out on a very small area of ground.

For the treatment of 1,000 gallons of sewage daily, two precipitation-tanks will be required, each to hold 1,200 gallons, and two filter-beds, containing each 2 square yards; for 10,000 gallons, two tanks holding 11,000 gallons each, and three filter-beds of 6 square yards each; and for 20,000 gallons, two tanks holding 22,000 gallons each, and three filter-beds each containing 10 square yards.

The last process which we shall describe is Conder's iron process. It was introduced about five years ago, and, unlike the International system, which has been used chiefly for large quantities of sewage, as from towns, this has been applied mainly to the sewage of isolated buildings, and in only a few instances to larger volumes. The chemical employed is sulphate of iron, and may be added to the sewage in one of two ways, either by means of ferrometers, one of which should be placed inside the building, close to each w.c. apparatus and sink, or by means of a small dissolving-tank at the side of a manhole just outside the building. The former method is in use at Windsor Castle, Buckingham Palace, Alnwick Castle, Hatfield, Crossley and Porter Orphanage at Halifax, Infirmary at Ayr, Eagle House School near Reading, and at many country houses; the latter method has been adopted at Chichester Barracks, Eastney Barracks, at Grange-over-Sands in Lancashire, and in part of the borough of Halifax.

By the former method, the chemical is added to the sewage at the very commencement of the drains, and by the latter, as near the commencement as possible, and this is in one respect a great advantage, as the sewage is rendered innocuous immediately after its production; in hospitals for infectious diseases, the value of such a disinfectant (for sulphate of iron is a good disinfectant) regularly applied is obvious. A disadvantage, which cannot be dissociated from the foregoing advantage, is that the silt produced by the action of the chemical will have a tendency to settle in the drains. It is said that a flow of half a mile an hour, or ·73 ft. per second, is sufficient to carry the silt along; this, we fear, is somewhat misleading, as a gradient of 1 in 1,700 is calculated to produce such a velocity in 6-in. pipes flowing half full, and of 1 in 1,200 in 4-in. pipes, and after making a large allowance in order to make up for the loss of speed caused by bends, the gradients would still be ridiculously small. Probably an inclination of 1 in 60 would be sufficient to keep house-drains free from deposits.

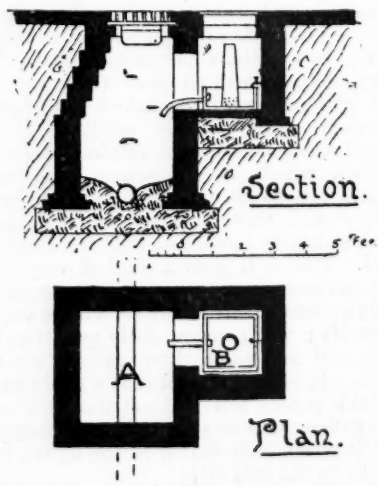
The ferrometer consists of an upright glass tube, in which the sulphate of iron is placed, and the perforated bottom of this tube dips into a porcelain cup, to which a small but regular supply of water is conveyed. In the cup half the skin of a lemon or orange is put, and this is replaced by a fresh piece once a week or when it ceases to float. The chemical is gradually dissolved by the water, which is regularly trickling into the cup, and the solution overflows and passes down a pipe into the trap of the water-closet or sink. This pipe needs occasional cleaning with a wire brush, as a slight deposit of oxide of iron takes place in it under certain conditions.

One pound of sulphate of iron is considered sufficient to disinfect for one person for a month, and the ferrometer can be regulated to dissolve more or less, according to circumstances; this is effected by means of set-screws, which regulate the depth to which the glass tube dips into the cup. The quantity of water required to dissolve the chemical is about one gallon a day for each person.

The mansion and lodge previously mentioned would require for their eighteen occupants about 2 cwt. of sulphate of iron per annum, which would cost from 12s. to 18s. (according to quality) if bought by the cwt., or about £3. 5s. if bought in boxes, each containing a charge for 100 days for one person.

The other method of applying the chemical is similar in principle to the one already described, but differs in detail. It is employed in immediate connexion with the drains themselves, and not with the internal fittings of

Figure 6.



the building. Fig. 6 shows the usual arrangement. Adjoining the manhole, A, is a small chamber containing a glazed earthenware tank, B, in which stands a cone of similar material, with perforations around near the bottom. The cone is filled with sulphate of iron, and a small stream of water, turned into the tank, dissolves this, and the solution over-

flows into the sewage-channel of the manhole. The quantity of water required will be rather less than a quart a day for each person. Half a lemon should be placed in the tank and renewed when necessary.

Immediately on its union with the sewage, the chemical begins its work of disinfection, deodorisation, and precipitation; and after a flow of a quarter of a mile or of about four minutes' duration, the work is complete. Where such a length of flow is not obtainable, the sewage must be discharged into a tank, so arranged that the contents may be kept in a state of agitation by the incoming sewage; in this process, unlike other chemical processes, quiescence is not desirable.

It is said that after the length of flow just mentioned, the sewage, consisting of a clear liquid and a fine black silt, is quite innocuous, and may be turned at once into a river; certainly this course would be good enough if the quantity of the sewage were small in comparison with the volume of the river-water, but otherwise, further treatment ought to be adopted. Settling-tanks in duplicate, somewhat similar to those shown in fig. 5, should be constructed, in which the silt can be deposited; the liquid can be drawn off by a floating arm and conveyed to the stream or in exceptional cases passed over land, and the silt can then be swept out, and, after the liquid in it has to some extent evaporated or drained away; can be dug into the land or spread upon it as manure.

The use of sulphate of iron as a sewage-precipitant is no novelty; it was tried at Northampton twenty-five years ago, and failed in its object; but Conder's process differs in one or two points from previous applications, and possibly these differences account for the success which has so far attended it. Professor Maguire, in his book on "Domestic Sanitary Drainage and Plumbing" (1890), thus writes:—"Sulphate of iron undoubtedly effects powerful action on sewage-matter in a dark drain. Whether it altogether destroys whatever is putrescible in sewage-matter, or only delays the process of putrefaction, is a question the writer cannot solve." Certainly we think that further treatment, as mentioned in the last paragraph, is desirable; but there cannot be two opinions as to the utility of a process which does, either for a time only or altogether, take away from sewage its evil properties at its very formation, and so prevents the spread of noxious gases in our buildings, and the formation of sewer-gas in our drains.

REGISTRATION OF PLUMBERS.—Mr. T. N. Andrews (secretary) and Mr. W. N. Elliott (master plumber) attended a public meeting in Penzance on the 25th ult., as a deputation from the Plymouth District Council to explain the objects of the national registration system. The Mayor presided, and there was a large attendance of trade representatives, the following being elected on a Local Committee to carry out the system in Penzance:—Messrs. Mowatt, T. H. Stewart, R. Kemp, H. Thomas, J. Trounson, and O. Caldwell.——At the annual meeting of the Hull District Council Dr. Sherburn, J.P., was re-elected president, and Messrs. T. B. Holmes, Councillor Cohen, and Dr. Mason, D.P.H., vice-presidents. The annual report of the hon. treasurer (Mr. A. E. White, C.E.), was adopted. The Council decided to ask the members of the trade for tenders for the material made up by the students at the practical instruction classes. A letter was read offering, on behalf of the Plumbers' Company, prizes and certificates to successful students. Pocket certificates were decided to be issued to registered plumbers yearly for production when required.——At the last meeting of the Munster District Council, at Cork, it was resolved:—"That a sub-committee be appointed to wait on the Corporation, and urge on them the necessity of appointing a properly qualified plumber for the purpose of inspecting the sanitary arrangements of the houses in the City."

THE SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers, held at the Town Hall, Westminster, on Monday evening last, Mr. W. N. Colam, President, in the chair, a paper was read by Mr. T. B. Lightfoot on "A Trial of a Refrigerating Machine on the Linde System." The author described the construction and arrangements of a testing station for refrigerating machines that had been recently built at Munich, and gave the results of a test trial with a refrigerating machine on the Linde system.

NOTES.

IT is with the greatest regret that we have to record in another column the unexpected death of Mr. John D. Sedding. He was one of the most really original minds among contemporary English architects; one of those who was never content to work in the ordinary fashion of the day, but always had his own impress to give to a building; and he was one of those who really felt the art of architecture as a form of poetic creation, not a mere system of planning and construction. He was strongly impressed with the feeling that this creative and artistic element could be realised in pure architecture, without any adventitious aid from painting or sculpture; his paper on this subject read at the Edinburgh Art Congress in 1889 was an eloquent exposition of this view, which he has practically illustrated in many most picturesque buildings; not that he was indifferent to the unity of the arts, but he realised the fact that architectural design had its own special field, and was not necessarily dependent on assistance from "handmaid" arts. In his passion for individuality he was sometimes led into what might be called eccentricity in architectural design, but it was eccentricity not without a charm of its own. His comparatively early death,—for according to the ordinary term of life he might yet have been among us for many years,—is a serious loss to English architecture; but by the many who knew him he will be even more missed as a man than as an artist. It is not too much to say, and we are sure many of our readers will echo the sentiment, that to know John D. Sedding was to love him. He was one of the most simple-hearted, genial, and kindly of men, absolutely without pretence or vanity, and one of those few to whom it is given to preserve in mature life all the enthusiasm and buoyancy of youthful feeling.

IT is worth note that the memory of the deceased Vienna architect, F. von Schmidt, is being honoured outside Austria, and especially at Berlin. Not only have there been memorial celebrations to the deceased held under the auspices of the architectural societies, and an exhibition of some of the deceased's wonderful examples of draughtsmanship opened, but also a subscription started, in connexion with the Austrian one, for the purpose of erecting a monument to him, in form of a statue, at Vienna. In the invitation to subscribe, special note is taken of the fact that the late artist has left a name and many an architectural monument that will outlive any statue raised, and that the proposed sculptural monument is to be placed solely as a tribute of esteem by the members of his profession.

THE passing of the second reading of the Public Health (London) Law Amendment and Consolidation Bills can only be regarded with satisfaction in the main, whatever details may be susceptible of improvement. In regard to the duty now put upon a houseowner or occupier of cleansing the foot pavement in front of his house, the criticism that this duty ought to fall on the locality and not on the individual is no doubt perfectly logical in theory, but we concur with Mr. Ritchie in thinking that the existing arrangement has great advantages in practice, in dividing the labour and providing for a much quicker and more economical cleansing of the footways than would be at all possible if it were left to the local authority, while it cannot be said that the duty imposes any great hardship or expense on the individual householder. Mr. Isaacson's proposal that there should be a provision inserted to prevent auctioneers and house-agents from letting insanitary houses would probably be, as Mr. Ritchie said, impracticable in working, if the sanitary authority were to be expected to undertake a prior inspection in order to see that this condition had been complied with. But we do not see why the house-agent should not be compelled to "attach to the agreement entered into a document stating that the house was in a good sanitary condition and fit for habitation," as in doing so he would take on himself the legal responsibility of seeing that the house was in such condition, and if it were otherwise it would be at his peril; the lessee would at least have a legal remedy against him, and the agent would find it his interest to see to it that there should be no ground of complaint that the house was insanitary. We hope therefore that this suggestion will not be lost sight of in considering the Bill in Committee.

THE Committee which will consider the important Bill of the Manchester, Sheffield, and Lincolnshire Railway has been nominated, and will begin its sittings next week. The Committee is, perhaps, above the average in general capacity, but is not remarkable for its purely business characteristics. The Chairman is Mr. W. Woodall, best known to the public as a leading advocate of woman's suffrage, and a manufacturer in the Midlands. Sir George Baden-Powell is a young Conservative politician of energy and capacity, who has given much attention to colonial subjects. Sir E. Grey is also a "coming" young man of the opposite camp. Mr. Wilson Noble is already known to many of our readers in connexion with a Bill of which he has charge. We cannot, however, but think that another member of high commercial standing might, with public advantage, have taken the place of one of the two last-named members.

AN unsatisfactory discussion took place on Monday evening, in the House of Commons, in regard to various Royal palaces. It was unsatisfactory because those who attacked the votes did so, not in a spirit of rational criticism, but in a quite heedless manner, as when Mr. Labouchere stated that Kensington Palace ought to be pulled down. Reasonable criticism, both of the condition and the management of these palaces, is useful and proper, but there appears to be no mean between wanton attacks and official defence. As regards Kensington Palace, Mr. Plunket could only say that it was in a fairly good sanitary state, which is a kind of half-hearted defence, such as in the mouth of an official is suggestive. Again, as regards Kew Palace, which Sir George Trevelyan rightly said was an interesting historical monument, there is a good deal to be urged against the thousand pounds of public money being spent upon it unless it is used for some public purpose. In the same way, however courteous it may be to allow the Duc de Nemours to occupy Bushey House, it is naturally a subject of reasonable criticism. The fact is, that these unused Royal residences should now be used for purely public purposes, such as museums and so forth.

A MELANCHOLY interest attaches to the Report for 1890 of last year's excavations at Troy, just issued by Madame Schliemann. In her brief preface to the Report, Madame Schliemann states that her husband had fully intended to begin work again in March of the present year. It now devolves on the devoted wife herself to complete the excavations, and, as a necessary preliminary, to edit the report of last year's undertakings. This falls into two portions,—a narrative by Dr. Schliemann himself, relating, with the usual rather tiresome prolixity, the troublesome Bötticher controversy (which had, indeed, one profitable result, that it impelled the reopening of the excavations), the visits to the site of illustrious persons, the general journal of the excavations, and a chapter on the inscriptions found. To this follows a supplement by Dr. Dörpfeld, discussing the architectural problems arising from the new work, a discussion illustrated by a revised plan. The excavators confined themselves on this occasion to elucidating the plan of the build-

ings found in the second stratum. Even with this restriction, the plan is complex enough. For within the limits of this second stratum buildings of no fewer than three periods occur; the periods are indicated on the plan by different cross markings. The details of the discovery can only be followed in connexion with this plan, but it may be noted that the main new points of interest established are: 1. The existence of a *third* system of walls inside the other two previously known. 2. The plan of a propylon which exhibits in its simplest form the main outline of, *e.g.*, the Athenian Propylæa, *i.e.*, a wall broken by a door faced and backed by a porch. 3. A building, whether megaron or temple Dr. Dörpfeld does not decide, but which might well be either, and which goes to show the common structural origin of both.

IN the course of a paper recently read at the Berlin Architekten Verein, by Professor F. Adler, on the results obtained at the Olympia excavations, it was stated that the original idea of having the excavations made emanated from Professor Curtius, who at the time proposed his scheme to the Crown Prince, afterwards Emperor Frederick III. It was mainly due to the Crown Prince taking the matter seriously and very energetically in hand that, soon after the formation of the German Empire, notes were interchanged on the subject between the Imperial Government and the Greek Cabinet, and that after a long correspondence the arrangement was come to that, if the excavations were made, all the original pieces of sculpture found should be Greek property; that Germany should, however, have the sole right of making casts and issuing publications. Alluding to figures and dates, Professor Adler mentioned that after the first sod had been turned on October 4, 1875, the six separate excavations made brought to light no less than 130 statues and busts, 14,150 bronzes, 40 buildings, 1,000 larger fragments of architectural work, 6,000 coins, and some 1,500 smaller objects.

IN a paper read at the Surveyors' Institution on Monday last, on "The Present Work of the Land Registry," Mr. C. Fortescue-Brickdale, Assisting Barrister to the Land Registry, drew attention to the advantage of making use of the system of public registry in the sale of landed property, as doing away with the immense expense and trouble of proving the titles of landed property. He mentioned one case in which, for the sale of an estate the value of which was under 5,000*l.*, the number of deeds and other documents in the abstract was ninety-one, and the abstract and deeds, stitched into a band 3 ft. wide, would have reached from the cross of St. Paul's to the floor of the Cathedral. The only remedy, he urged, was to establish a public registry with power to record changes of ownership in such a way as to preclude enquiry into any past transaction. He pointed out that this had been successfully done in Australia and in Prussia for several years, and the system had lately been begun in Austria. In England, he added, such a registry had been in existence for some time, but is not yet as well known as it should be. Its offices are in Staple Inn. The subject is, of course, strictly speaking a legal one and does not affect architecture or construction, but it may have an important indirect effect in facilitating the transfer and development of building estates.

FROM a circular which we have received from the Dundee Institute of Architecture we learn that a suggestion has been made to the Council of that Institute to the effect that an alteration is desirable upon Article VI. of "General Conditions of Contract," agreed to by the architects and builders of Dundee and vicinity in 1884. The proposal, we learn, "arises from the fact that this Sixth Article makes no provision for payment of the expense of re-measurement, and thus the way is open for either party to embarrass the other by groundless allegations of deductions from or additions to the schedule of quantities." An addition is therefore suggested as follows,—viz.:—"And in case of re-measurement having to be resorted to, the party failing to establish 50 per cent. of the value of the matters in dispute shall bear and pay the actual cost incurred by such re-measurement, such payment to be made out of the most readily available moneys under the contract." Means are being taken to elicit the opinion of the professional members of the Institute upon the subject.

A CURIOUS and important case is reported in the current number of the Law Reports. It is that of Turner *v.* Goldsmith. The defendant, who was a shirt manufacturer, made an agreement in writing with the plaintiff that the latter should serve the former, as agent, canvasser, and traveller on the following terms: first, that the agency should be determined by either party at the end of five years by notice; secondly, that the plaintiff should do his utmost to obtain orders for and sell the various goods "*manufactured or sold* by the defendant as shown from time to time by sample or pattern to him." After about two years the defendant's manufactory was burnt down, and thenceforth the plaintiff was no longer employed. Consequently he brought an action for damages for breach of contract, and the Court of Appeal held that he was entitled to recover them. This appears at first sight to be a "hard case," and we are by no means sure that it is not so in reality. If the defendant's factory was burnt down, obviously, he could not have the plaintiff's articles to sell. But in the contract appear the words "sold by." These it were which were the turning-point of the decision. It has been held that if a particular thing is in the contemplation of the parties to be in existence as the basis of a contract, then if that thing ceases to exist the contract is at an end. But here the Court considered that the words "sold by" showed an intention to employ the defendant to sell articles other than those manufactured by the defendant. Of course, the moral of the case is that manufacturers and canvassers should be very careful as to the terms of these contracts, and that each side should insure their interest under them.

WE have received from Messrs. Gritten & Parmley some particulars of their "patent fire-proof plaster casing for electric light leads." This casing is made of plaster well incorporated with slag wool, can be made to any particular design, to curves of any shape, and is adapted for application to the ornamental panellings of ceilings and walls, no matter how rich the mouldings may be. Perhaps the most important property claimed for this material is that it will insure absolute insulation and non-conduction of heat. A consideration that frequently makes people hesitate about having the electric-light installed in their houses, especially when the decorations are of a costly character, is the fact that no provision whatsoever having been made for the electric-light wires by the architect, the cutting-out and making good will not only frequently raise the cost of an installation to a prohibitive sum, but permanently disfigure the rooms into which they are introduced. Latterly one or two firms of decorators have endeavoured to induce builders to use skirtings, dado rails, picture rails, and cornices in which grooves have already been made, with ornamental covers easily removed for the introduction of the wires, should they be required at any future time. Until recently, we believe, this has only been done where wooden casing could be used, and it will certainly be a great advantage if Messrs. Gritten & Parmley can introduce the use of plaster casing, which would not differ in appearance from the mouldings and cornices now universally employed. It seems doubtful, however, if plaster can replace wood for ordinary casing, owing to its weight, brittleness, and other defects incidental to working with it, though in situations where it can be used it will unquestionably enormously reduce risks of fire through the accidental heating of the electric light mains through any cause.

IN reference to the subject of the disposal of sewage from isolated buildings, treated of in this and the preceding number, a correspondent describes a method of dealing with the sewage of a detached country house, which, he says, works satisfactorily. The house is situated on rising ground, and on a low-lying portion of the ground a space of about 14 ft. square is surrounded by a wall 8 ft. high. Entrance to this enclosure is had by a close gateway at one side, and within the enclosure is placed an iron tank, upon a truck, and into this tank the sewage from the house is drained. Disinfectants (chiefly sifted ashes and dry soil) are thrown into the sewage from time to time, and when the tank is nearly full it is removed, and emptied at places where the sewage can be utilised as manure. During the time the tank is out of the enclosure, which is never for a lengthened period, the end of the drain-pipe is closed, so as to prevent any escape in the interval. The drain is ventilated by an open grating. The rainfall does not flow into the tank, but is directed elsewhere. The enclosure is situated in the most unobtrusive position that could be found, and is surrounded by a belt of trees and shrubs.

ADVERTING to our "Note" of last week, we find, upon inquiry, there can be very little doubt that the Westminster Life Office, designed, in 1832, by C. R. Cockerell, is No. 429, Strand, by the corner of Agar-street. It is conspicuous for a bold façade having two central Doric fluted columns, engaged, over which is a frieze and cornice carried along the return, the former having portcullises (the Westminster badge), wreaths, and anchors between the triglyphs. In the spandrils of each of the three front first-floor windows are two figures in high relief. A lion with the union-shield stands in the central compartment of the second-floor, above are a light pediment, and attic. This is the house, occupied some thirty-five years ago by the inglorious Royal British Bank, since by the Briton Insurance Company, and now by the British Medical Association and *Journal*, whose sale and interior alterations we described in our columns on August 21, 1886, and February 19, 1887.* When surveyor of St. Paul's, for which he set up a new ball and cross (1821), Cockerell had offices at No. 8, Old Burlington-street. He died at No. 13, Chester-terrace, Regent's Park, on September 17, 1863, and was buried by the side of Rennie, his father-in-law, and near to Wren, in the cathedral crypt. His figure will be found between those of Pugin and Barry on the Albert Memorial. And let us not forget that, in addition to the fine volumes wherein he enshrined the results of his travels in Sicily, Greece, and Asia Minor, we possess another "memorial" of his labours,—the reliefs of the frieze of the Temple of Apollo the Deliverer, at Bassæ near to Phigaleia in Arcadia, which, with the sculpture, now at Munich, of the Temple of Jupiter Panhellenius in Ægina, he discovered in 1811–2, and which the State purchased for 19,000*l.* in 1815–6. The Phigaleian marbles are rearranged in what used to be the Print Room, at the British Museum, and there are his drawing for the restoration of the west pediment of the Parthenon and a copy of his very rare print, conceived at Florence in 1816, with a MS. title: "Congettura del Signor Cockerell sopra la Famiglia di Niobe."

NEXT June the late Mr. Money Wigram's executors will offer Esher Place for sale at the Mart. Within the beautifully-timbered grounds stands, by the River Mole, a gate-

* In his article in the "Dictionary of National Biography," Mr. Louis Fagan says that Cockerell designed the Westminster Fire Office [No. 27], King-street, Covent Garden. That Company, with its neighbour, at No. 28, in the same block, had no connexion, we are told, with the Office in the Strand.

house or tower of the "stately brick mansion" built by William de Wainflete, Bishop of Winchester 1447-86. William I. bestowed the manor upon St. Leutfrid's Abbey; the Abbot sold it to Peter de Rupibus, *temp.* Henry III.; Edward I. gave it to the See. Wolsey, having succeeded Fox as Bishop of Winchester in 1528, meant to rebuild the house. But on October 18, 1529, he was commanded to surrender the great seal, and to retire to Esher. There he abode three or four weeks, in sorry state, attended by Dr. Butts, and ceded York-place (Whitehall). Queen Mary restored the lordship and manor, with the park, about 185 acres in all, as part of Hampton Court Honour, to Bishop Gardiner. Her sister bought it back again of the See in 1583. In the eighteenth-century a division of the property was made. John Latton sold to Thomas Holles Pelham, Duke of Newcastle, all of the manor (including Watevile and Claremont) excepting Esher Park and the house, which latter he sold to Peter de la Porte. Bought by Dennis Bond in 1724, Esher-place was sold by him, in 1729, to Henry, the Duke's brother, whose residence here Thomson celebrates.* By this time little more than the two gate-ways of the bishop's house remained. Henry Pelham employed Kent to make additions thereto, and Kent retained the present gateway for a central feature of his design. Esher Palace ultimately passed to John Spicer, for whom Edward Lapidge built the existing house, of brick, stuccoed, and with an Ionic order on each face, upon higher ground away from the river. Spicer pulled down all Kent's work, but kept one of the towers, and planted ivy against its walls. The tower, being of red brick with stone dressings, and having large octagonal turrets, is four stories high; the third and fourth stories are machicolated. It may be compared with those of Layer Marney, *circa* 1506 (see the *Builder* of April 3 and 10, 1886), and Lees, near Felstead, founded *circa* 1229. E. W. Brayley gives two views in his "Surrey" (1841), and mentions the newel staircase of brick, in the roofing of which, he says, "the principles of the construction of the oblique arch (a supposed invention of modern times) are practically exhibited." Other views are by Knyff and Kip, *circa* 1695; J. Rocque, showing Kent's additions, 1737; and Luke Sullivan's large print of the west front, 1759. "Wolsey's Well," a resting-seat on the high road, bears a stone inscribed with "H. P." and the cognisance of the Pelhams,—a heart-shaped buckle, an augmentation of honour to commemorate Sir John Pelham's capture, on Poitiers field, of John, King of France.

WE referred last week to Mr. Jacoby's bill for putting further restrictions on the London organ-grinders, and to the foolish letter in the *Times*, in opposition to it, expressing at the same time our fear that the sentimentalists would carry the day. The same afternoon there appeared in the *Pall Mall Gazette* the following communication from Mr. Jacoby:—

"I desire, through the medium of your widely-read paper, to say that, on account of the strong feeling in the House against the Itinerant Street Musicians Bill, it is hopeless for me to proceed with the measure. The musical (?) mendicant has won the day, thanks to hyper-sensitive fanatics, who in the name of 'liberty of the subject' have no consideration for the sufferings of peace-loving citizens. The courage of the anonymous correspondent to the *Times*, 'R. B. B.,' is beneath contempt. If he is a Radical, why this secrecy, and why does he select the favourite organ of coercion to pour out his woes?"

This is the third effort we remember to bring some legislation to bear on this intolerable London nuisance, and on each occasion the good intention has been frustrated by the clamour of silly people on the ground of philanthropy. The following remarks from our contemporary the *Lancet* serve to show that the medical mind is on the same side with the artistic mind on the subject:—

"The nuisance caused by street 'musicians' is a very ancient grievance, and it is greatly to be hoped that Mr. Jacoby will be more successful in his proposed measure for its removal than others have been before him. . . . A large proportion of the inhabitants of these Kingdoms must dwell in large towns or cities, and to all those who do not possess the power of abstraction, the wear and tear of nerves, the worry and trial of temper caused by noises, tell very seriously on the health, and, it may be added, even on the duration of life. Street noises may be divided into those which are inevitable, and those which can be prevented. To the former belong those caused by street traffic, to which people get so used that the quiet of the country is often irksome; while modern forms of pavements have in recent years done something to diminish them. The principal noises which can and ought to be prevented, are those caused by street cries and street 'music.' . . . It is unfortunate that the subject of street 'music' has never been treated either in or out of the House of Commons with the seriousness which it merits. Those who complain of it are ridiculed, or a plea is urged on behalf of the poor who but for these itinerant 'musicians' would never hear that 'music' which 'hath charms to soothe the savage breast.' It may be very safely asserted that the music alluded to by the poet was very different from the discordant sounds which issue from German bands and Italian barrel-organs. Moreover, Londoners have this so-called street music inflicted upon them at any hour of the day, however unseasonable, from early morn to dewy eve, and even up to nearly midnight. The late Mr. Babbage, the late John Leech, and others, who have earned fame in literature, had their lives harried, if not shortened, by this pest, and the marvel is that it has been tolerated so long."

THE Exhibition at the French Gallery in Pall Mall is a better one than last year, and contains several remarkable works, among which Professor Holmberg's "The Virtuoso at Home" (44) is pre-eminent. This is a large picture representing an old gentleman seated, facing the spectator, behind a table covered with curios, and examining an old print which he holds in his hand. The various articles on the table are painted with most brilliant realism, as well as the architectural details of the room; but the best point about Holmberg's works of this class is that however brilliantly the accessories are painted, the figure is always the most interesting and powerful thing in the picture. The head of the man in this case, a very characteristic though not a very attractive type, is painted with remarkable power. Across the room is a smaller work by the same painter, "The Sacristy; Leisure Hours" (75), an interior lighted by the subdued radiance of a Renaissance stained-glass window, against which is relieved a gowned figure reading to an old ecclesiastic in scarlet robes, an acolyte (whose face is the best thing in the picture) standing behind. Professor Knaus has given us a picture of far greater interest than the little dirty boys he used to be so fond of; an interior apparently of a working-man's club, with a single figure of a man scowling in the indulgence of injurious thoughts against things in general, the *Neue Freie Press* and other journals filed on the wall above him. The expression of the "malcontent" is admirably given. Near this a large painting by M. Gustave Courtois, "Recueillance" (15) represents a woman and her little son, a boy of ten or so, seated quietly in a Venetian church, the wall draperies of which form a background to their figures; a boldly designed wrought-iron candelabrum fills up one side of the picture effectively. The boy's face is exceedingly beautiful; it strikes us, however, that both his head and his hands are rather too large for the general proportion of the figure. There is a splendid painting by Rosa Bonheur of a "Bouc et Chèvre" (43), the heads and necks only of the two animals, treated with that monumental grandeur of character in which she stands alone among animal painters. Herr Schwartze's painting "The Orphelinat Bourgeois, Amstersdam" (64), is a life-size group of girls in red and black dresses with white tippets, singing the Psalms; there is a fine decorative effect about the work, but it is too large in scale for the subject, unless it is intended as a kind of presentation or Board-room picture for some such institution as it represents. Professor Heffner's pictures "On the Norfolk Broads" are merely the old Heffner receipt with a new name. Herr Heffner goes from one country to another, but his effects are the same everywhere—

"Cœlum non animum mutat, qui trans mare currit"—

and he wishes to persuade us that the atmospheric tone and character of the landscape are the same in Norfolk as in Bavaria. The large work by Israels, "The Sick Wife" (36) has not his usual sentiment, and is not very interesting, nor do we care for such painting of squalor and dirt as in his "Old and Worn-out" (52); the small painting, "The Seamstress" (25), is in his best manner. Among other good works are Clay's "Stormy Weather" (14), Kate Bisschopp's "The Beginning is Difficult" (29), and one of Meissonnier's tiniest of pictures, "The Connoisseurs," which in fact it was impossible to see, as it was placed on one of the sofas, and a row of ladies persistently sat in front of it.

WE have received the first number of *The Trade Unionist*, a weekly paper. The lines on which it is to be carried on are pretty well indicated in the following sentence on the first page:—

"We are eight-hour men out and out, that is, until we see a chance of getting a seven or six hour day. We are strongly opposed to systematic overtime, and are favourable to a monthly day's holiday for every worker, and are opposed to more than five-and-a-half days' work in any one week."

Perhaps *The Trade Unionist* will follow this up by a little calculation as to the possible effects on the price of food, and on the withdrawal of work from English hands to put it into foreign hands, which this programme would be likely to lead to. And as a matter of logic why stop at a beggarly reduction of two or three hours a day in the time of working? Why not go in for doing no work at all? That would be still simpler, and only carrying the same policy a little further.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE eleventh ordinary meeting of this Institute for the present session was held on Monday evening last, at 9, Conduit-street, Mr. Alfred Waterhouse, R.A. (President) in the chair.

Architecture: an Art or a Profession?

Professor Kerr said that he had a remark to make upon the minutes, and he would do so without raising any discussion upon what was issued in the "Transactions" from time to time. They had all observed a very interesting correspondence between a committee of architects and others on the one hand, and the Council on the other. Those gentlemen had assailed the Institute upon a very important question,—viz., whether the Institute was an artistic guild or not. The Council very properly proposed a conference, but the gentlemen in question, who were men of high standing, practically declined to appoint their delegates, and the Council thereupon met them half way by saying that nothing further could be done. To outsiders this looked like the well-known case when—

"The Earl of Chatham, with his sword drawn,
Was waiting for Sir Richard Strachan;
Sir Richard, longing to be at 'em,
Was waiting for the Earl of Chatham."

It was extremely important that they should know what the Council proposed to do in the matter. In a month's time the annual general meeting would take place, which would be an excellent opportunity for discussing the whole question, or the matter could be discussed at one of the three intervening Monday meetings. If not, he would venture to draw attention to the question at the annual meeting, and would then propose "That while the Institute recognises the value of the Examinations, it does not, as it is supposed, sacrifice its character as an artistic and scientific society."

The President said that the Council would

* "Slow let us trace the matchless vale of Thames:
. . . . . to royal Hampton's pile,
To Clermont's terrac'd height, and Esher's groves,
Where in the sweetest solitude, embrac'd
By silent windings of the silent Mole,
From court and senates Pelham finds repose."
'The Seasons.—Summer.'

consider what was best to be done to meet Professor Kerr's suggestions.

Origin and Mutation in Indian and Eastern Architecture.

Mr. William Simpson, R.I., M.R.A.S. (Hon. Associate), then read a paper entitled, "Origin and Mutation in Indian and Eastern Architecture." The following is an abstract of the paper:—

In his introductory remarks, the author claimed one merit for his paper,—that it brought forward new material, some of which came from the rather out-of-the-way regions of Afghanistan and Central Asia. Dealing first with the Chinese pagoda, according to the learned Chinese its design had been brought from India with Buddhism, and was a copy of Indian structures. There were no remains of such monuments in India, and he surmised the origin was the Buddhist stupa or tope; but how the umbrellas which surmounted the stupa had grown into a series of rooms, each with a roof, was a mutation difficult to account for. In 1861, however, he had made a sketch of some old sculptured stones erected like pillars at Dras, near Kashmir, on one of which was a representation of a stupa containing the Tee and thirteen umbrellas, forming a high spire standing above the stupa. This gave a solution of the Chinese pagoda; those about Pekin and Northern China having only one room at the base, with the roofs resting on each other exactly like the umbrellas of the sculptured stupa. Professor Beal, also, had mentioned forty-two pagodas at Lo-Yang, as being "formed after Indian models;" and there could be little doubt but that Buddhist monks introduced the stupa or pagoda into China from India *vid* Afghanistan. The umbrella had become a royal symbol over a large portion of the East, as was seen in Assyrian sculptures, in India, and in China; being a royal emblem it became a sacred one; was placed over figures of Buddha and stupas; and when stupas had been converted into pagodas, the umbrellas had been changed into regularly constructed roofs. The sikhara, or spire of the Hindu temple, was next considered. The temple was a square cell, with a small door on one side and the spire a continuation of the four sides, tapering with a curve but not to a point, with a large circular object resting on the summit, upon which was generally a vase or water jar. This temple most probably originated in a wooden form, but the transition to stone must have occurred a long time previous to the Bhuvanes'vara temples, a theory which had often been proposed. But he could not believe in the transition of the stupa to the sikhara; on the other hand, he suggested that this form of temple was first constructed with bambus. The cell could easily have been formed of bambu posts; the sides covered with reed mats; and the four bambus at the corners, rising higher than the cell, would be covered in some simple manner and bound together, with the upper ends bending inwards, thus reducing the width of the spire at the top. If this were the correct solution it explained the chief problem; and, while with changed material new forms in the details would appear, the original outline would still exist. In Bengal was a peculiar type of temple, the sikhara of which was admittedly of bambu and thatch origin, although differing in detail from that of the northern temple. This bambu sikhara was little more than a roof; but a square platform was left on the top upon which a small model of the temple below, also with a bambu sikhara, was placed. A photograph of a festival car, in a partly dismantled condition, showed the bambu framework which gave the outline of the sikhara, and these cars, which were simply temples on wheels, might have been the origin of the Hindu temple. But a new and entirely different stratum of material, on further consideration, appeared to offer a much more probable origin. The sikhara belonged more particularly to the northern style of architecture, and to temples devoted to Siva. Having referred to the burial of Hindu ascetics in a sitting position, quoting from Dr. Rajendralala Mitra's work, a paper by Mr. Rivett-Carnac, and an account of the Jangams by the late C. P. Brown; and having given strong evidence that the worship of Siva had been originally connected with funeral rites, he said he considered that the aboriginal inhabitants had made their graves round, which he took to be the stupas, while the Aryans made them square. And these graves or tombs he considered the origin of the Saiva temple.

One of the primitive tribes in the Nilagiris of the Madras Presidency was known as the Todas, and their religion and temples formed an interesting study. The roof of a temple to which the Todas gave the name of "Boath" was a tall cone, the apex of which was crowned with a large stone under which the sacred relics were kept. This established the accuracy of the suggestions by Fergusson and Dr. Burgess that the Tee on the top of the stupa was a relic-shrine or relic-chamber; while the repetition of the temple below in the sikhara of the Bengal temple was also most probably a relic-holder. He was also inclined to believe the amalaka, or the vase, on the summit of the Saiva temple sikhara, was originally employed to contain relics.

Dealing next with the barrel-roofs of chaitya caves,—chaitya being another name for stupa or tope,—and having described their formation, the author said he had tried to find the reason why the same people who now produced the simple flat roof constructed such an elaborate work, and thought he had at last discovered the origin, as well as the manner in which it originated, in the Toda house. This was constructed of bambus, which formed the two sides and the roof. The bambus were placed in a row, the upper ends of both sides being bent inwards till they met in the centre, where they were bound with split rattan and the whole thatched with grass. The result was what might be called a barrel-roof, the outline being a compromise between a pointed arch and the oval Sassanian arch. It was probable that the roofs of the Behar caves, small and simple compared with the magnificent chaitya halls of Western India, were also developments of the Toda house, and not copies of a constructive arch. Mr. Simpson then proceeded to trace these forms through Afghanistan to Central Asia and Khorassan, where constructive arches, domes, and barrel-roofs were to be found, and so to arrive within measurable distance of the region covered by Mr. Phené Spiers's Paper on Sassanian Architecture.* The number of old Buddhist caves in Afghanistan was very large, and their exploration was due to the late Afghan Boundary Commission. They seemed to have been all open in front and rectangular in plan. As a rule the roof was circular, but at times the upper part was flattened. A marked feature was a drip at the spring of the arch. At Hada, near Jellalabad, were one or two small square caves with domes. At Dowlutabad, on the eastern bank of the river Heri Rud, which formed the eastern boundary of Persia with Afghanistan, he had found what he believed to have been Buddhist caves, and, if his belief was correct, the latest monumental evidence of the extension of Buddhism westward in that part of the world.

While the Commission wintered at Bala Murghab, a number of caves were discovered, and in two cases plans and sections were made. Major F. de Laessoë, while stationed at Penjdeh, discovered an interesting group of caves, forming quite an underground town. The sides of all of them were perpendicular, with a drip at the spring of the arch, the arch itself being "pointed." The author was indebted to Major Talbot, R E., for plans and sections of a series of caves, at Haibak and Balkh, which would prove of great value as bearing on the history of the dome. The dome over a square cave, an illustration of which was exhibited, introduced an entirely new form, being evidently excavated in imitation of a structural dome; and, with the exception of a few belonging to Jain temples, no constructed domes existed in India until the Mohammedan period. That it was a copy of a built form was manifest from the pendentives. The dome was not pointed, but round at the top, in the same form as the Sassanian. It was all but certain that this Central Asian form of dome belonged to a style of architecture closely allied to the Sassanian, the only difference being in the number of concentric arches; three was the rule in the Haibak caves, while in the palace of Serbistan there were at least six or seven. An important point was whether the Haibak caves were exceptional or not, and the author considered they were not, but that if the multitude of caves in the locality were visited and drawn, the same structural type would be found in them all. Another point to be noticed was the absence of the slightest touch of Greek influence in them, although Greek artists and architects must have gone to Balkh, otherwise the Greek influence visible in the sculptures and in the stupas, of which remains still existed in Afghanistan and the Panjab, could not be explained.

In conclusion, Mr. Simpson said that all round, curved, or domical forms in Indian architecture had their source in structures of wood—more particularly bambu; and that in tracing the form of the caves from near Buddha Gaya to Afghanistan and Central Asia, it must be owned that their simplicity of form gave but a slender means of comparison. Still, it should be remembered that all the main features of the Behar caves were found more or less in a rude condition in the Afghanistan caves, and as he knew of no others nearer to Afghanistan than those in Behar, the conclusion seemed reasonable that the forms were carried from that place. From sculptures it was known that domes were constructed in Mesopotamia at a far distant date; in Central Asia there was no evidence of this kind; but his paper would help to favour the supposition that any mode of building in one of these countries was probably practised in the other; and considering that the civilisation of Central Asia was very old, and had been very celebrated, he thought the claims of Central Asia to have produced the dome were as good as those of any other part of the world.

In the discussion which followed,—Mr. R. Phené Spiers said that the subject of the origin and mutation of architectural form had occupied his attention for some little time, and one of the first suggestions he had received with regard to the origin of Indian buildings was from Mr. Simpson. The caves which were illustrated on the screen were remarkable, and seemed to be either the copies of Sassanian temples or of somewhat similar buildings of the same country and time. That portion of the paper was an addition to their knowledge, and proved that these had been copied from the arched construction of burnt bricks in the same way as some of the other examples shown had been copied from bamboos and other forms. He hoped the paper would lead some of their students to take up the question of the origin and mutation of features in Indian architecture. He moved a vote of thanks to Mr. Simpson.

Mr. W. Kidner remarked, that during his residence in China he had been struck with the fact that the tent he saw used by the Mandarins supplied the original type of the Chinese roof.

Mr. John Slater, B.A., seconded the vote of thanks to Mr. Simpson, and said that anyone who desired to write the history of the evolution of architecture must take account of Indian buildings. He was rather surprised at Mr. Simpson stating that he had given up the idea of the car as the prototype of the temple. It was a matter of common knowledge that the origin of all religions had been the totem of the family, and as no doubt the early Indian tribes carried this totem about with them, it would be put into a car, which, when they settled down, would be taken as the type of the temple, very much in the same way as the tabernacle formed the prototype of the Hebrew temple.

After a few remarks from Mr. Campbell Douglas, the resolution was put and carried by acclamation, and Mr. Simpson briefly replied.

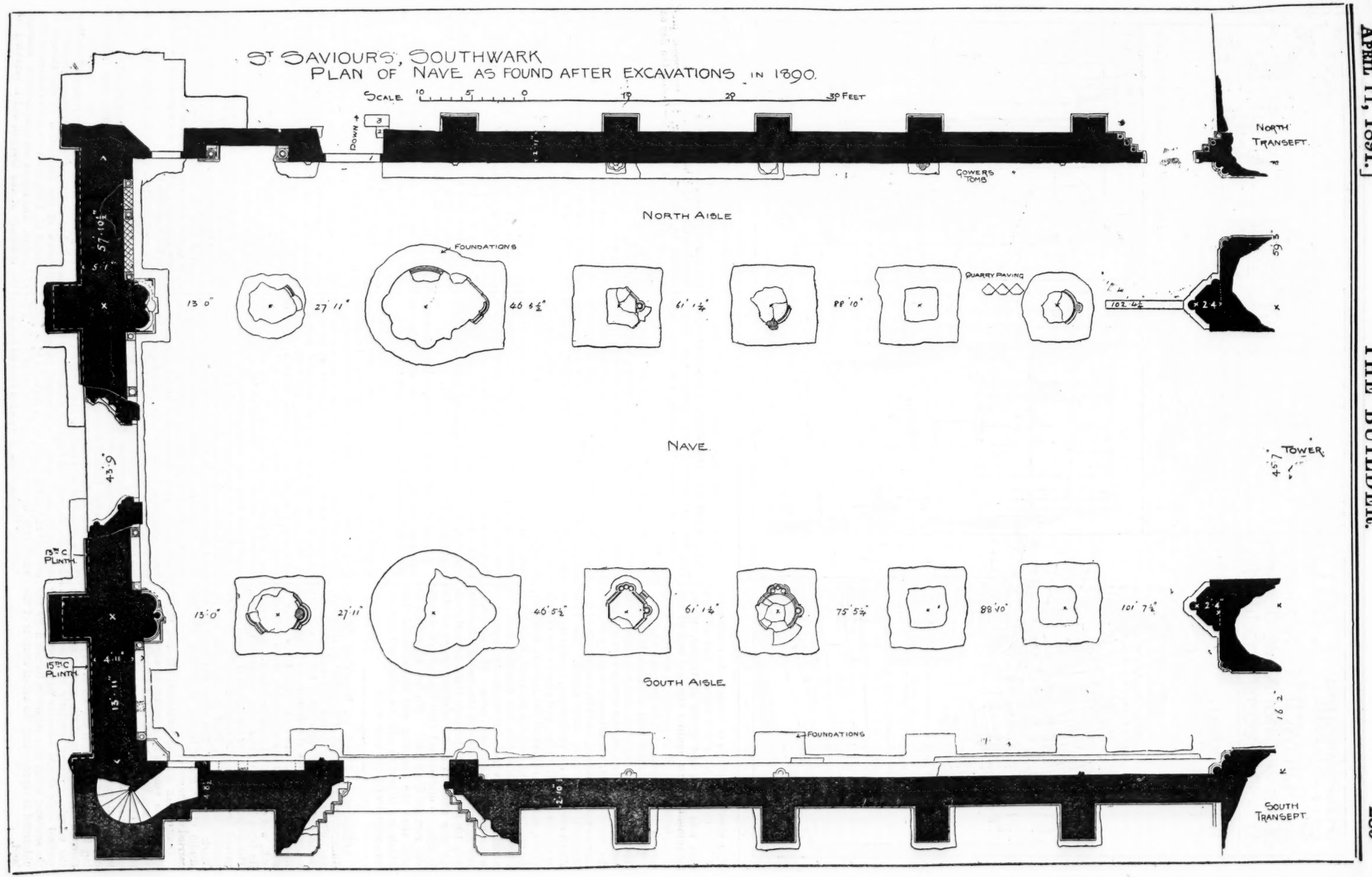
The President announced that the next meeting would take place on Monday, the 20th inst., when papers on "Decorative Painting" would be read by Messrs. W. B. Richmond, A.R.A., Ford Madox Brown, J. D. Sedding, and N. H. J. Westlake. The meeting would be held under the arrangement of the Art Standing Committee.

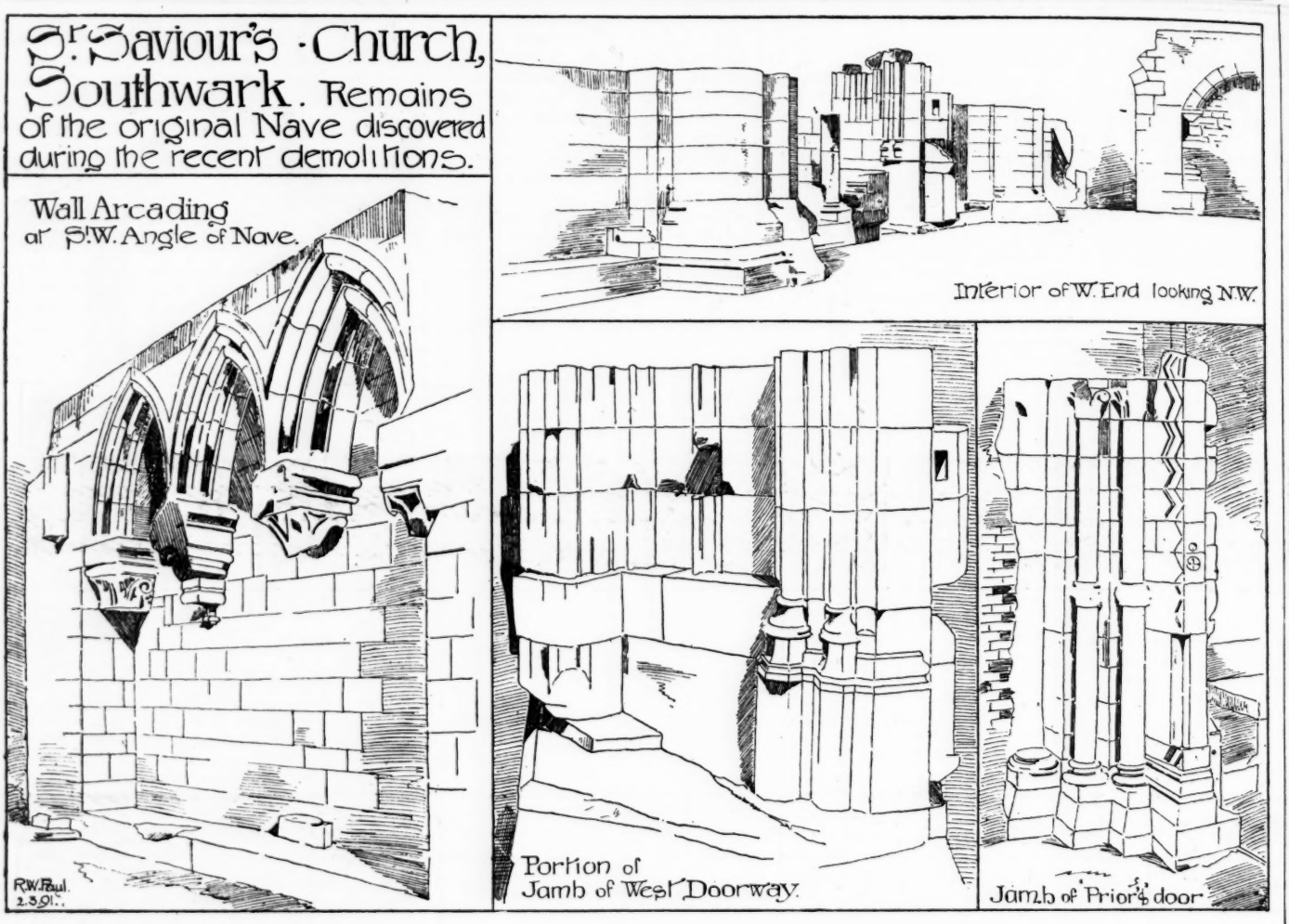
The proceedings then terminated.

* See *Builder*, December 6, 1890, p. 438.

ST. SAVIOUR'S, SOUTHWARK.

WE publish to-day, by the kind permission of Sir Arthur Blomfield, a ground-plan of the thirteenth-century nave of S. Saviour's Church, Southwark, which exploration on the site, after the destruction of the modern brick nave, has revealed. The plan shows the position of the columns of the nave arcade, and the outer walls generally, some of which are standing several feet above ground. The north wall of the church is Norman, and its buttresses still remain. At the east end, next the north transept, are the jambs of a Norman doorway which led to the cloisters situated on this side. A door at the other end, but of plain design, is still partially standing, with a monumental arched recess immediately eastward, some-


ST SAVIOURS, SOUTHWARK
PLAN OF NAVE AS FOUND AFTER EXCAVATIONS IN 1890.
SCALE 10 5 0 10 20 30 FEET
DOWN
NORTH TRANSEPT
GOWERS TOMB
NORTH AISLE
FOUNDATIONS
QUARRY PAVING
59'5"
13'0"
27'11"
46'5½"
61'1½"
88'10"
102'4½"
24'
NAVE
43'9"
TOWER
45'7"
13TH C PLINTH.
15TH C PLINTH
13'11"
4'11"
SOUTH AISLE
FOUNDATIONS
16'2"
2'10"
SOUTH TRANSEPT


St. Saviour's Church, Southwark. Remains of the original Nave discovered during the recent demolitions.
Wall Arcading at S.W. Angle of Nave.
R.W. Paul. 2.3.91.
Interior of W. End looking N.W.
Portion of Jamb of West Doorway.
Jamb of Prior's door

what similar in shape to those in the north aisle of the choir. Near the eastern end of this wall was found the grave of Gower, whose monument is now against the east wall of the south transept. It is intended, we believe, to restore this monument to its old position.

The wall arcading still remains in a fragmentary state on the west, and a portion of the south walls. That at the south-west angle is the most perfect. A fifteenth-century western doorway was inserted, and the fragments of the panelled jambs have been found. The later plinth overhung the earlier one, as will be seen by reference to the plan, and also to the sketch, which, with the others of the Norman doorway, the wall arcading, and the west end, were made a few weeks ago before the demolition of the remains, which was found necessary in order to make way for the new work. The proposed new nave we have already illustrated (*Builder*, May 10, 1890), and although the discoveries on the site have no doubt modified some of the details, we understand that the general design will remain unaltered. We are also glad to hear that the arcading and monumental arch which we illustrate will be preserved and incorporated with the new work.

ADDITIONS TO ALTAR, ST. BARNABAS CHURCH, GUERNSEY.—The church of St. Barnabas, Guernsey, was built as a mission church, and dedicated in the summer of 1874. It seats about 500 worshippers, and was erected from the designs of Sir Arthur W. Blomfield, A.R.A. At that time funds were a serious object, and the altar-table, made of British oak, was of the barest possible design. Since then its front has been filled with sculptured figures. The subjects chosen are the figures of seated saints, carved in relief, and in recessed panels. They represent St. Peter, St. Paul, St. Barnabas, and St. Mark respectively. The altar was sent to the studio of Mr. Harry Hems, at Exeter, who has carried out the work.

GEOLOGICAL MAP OF ENGLAND.—Messrs. G. W. Bacon & Co. send us their pocket geological map of England and Wales, which is not a very harmonious map to look at, but the strong and rather crude colours used serve to make the confines of the various outcrops of strata plain to the eye, at all events, and the map is convenient in size for carrying in the pocket when travelling. Four sections through various parts of the country are given in the margin, coloured similarly to the map. A vertical scale should however have been given for the sections, which may otherwise be taken by the unlearned as representing the actual contour of the land.

THE LONDON COUNTY COUNCIL.

THE London County Council reassembled on Tuesday afternoon last, after the Easter holidays, Sir John Lubbock, Chairman, presiding.

Finance.—This being "budget" day, the estimates for the year were brought up by the Finance Committee, whose Chairman, Lord Lingen, made a long speech in explanation of them. The upshot of all the details is that the amount required to be raised for the year ending March 31, 1892, is 1,581,398*l.*, equal to a rate of 11 75d. in the pound outside the City (9·50d. in the City), as compared with 13·25d. raised in 1890-91. The reduction of 1½d. in the pound in the total rate is due mainly to an increase in the estimated receipt from the Exchequer Contribution brought into account, and to the increase in the productiveness of the rate, owing to the quinquennial valuation which comes into force on April 6, 1891.

Wages of Builders' Labourers.—An adjourned report of the Special Committee on Contracts, dated February 24, was as follows:—

"We have had before us a letter from Mr. A. Humphrey, The General Secretary of the Navvies', Bricklayers' Labourers', and General Labourers' Union, dated December 3, 1890, alleging that in November last Messrs. Mowlem were employing labourers on works for the Council at Victoria-street, Wapping (Cable-street Artizans' scheme), at the rate of pay of 5½d. per hour. Upon receiving this letter we asked Messrs. Mowlem whether they had any observations to offer upon the statement contained in it. In reply, they forwarded, under date December 18, a copy of a letter which they had addressed to Mr. Humphrey in reply to a letter from him on the subject, and stated that they had 'no other observation to make upon the matter.' In this letter to Mr. Humphrey, dated November 28, 1890, Messrs. Mowlem & Co. state:—'We are paying the men on our works at Cable-street what we consider to be fair rates of wages according to the work they are doing. They are perfectly free agents, and, if any of them are not satisfied, it is quite open to them to leave the work and go elsewhere if they think they can better themselves by so doing.' We have ascertained from the Council's Assistant Engineer that the contract for the works was for a lump sum, but that a schedule attached to the contract showed that 6½d. an hour was the rate which would have to be paid by the Council for labourers' time in the event of any extra works being required to be done, which rate, however, included the use of tools. The Assistant Engineer has also stated that he has been informed by Messrs. Mowlem that at present there are no labourers employed by them on works for the Council who receive less than 6d. an hour. We therefore directed that Messrs. Mowlem should be written to, asking whether, in the week previous to the 22nd of November (being the day on which Mr. Humphrey made his inquiries) they were paying some of the labourers employed upon the Council's works under the Cable-street scheme at the rate of 5½d. an hour; whether that was considered a fair rate of wages for labourers; and whether there were, at the date of the letter, any labourers employed by them upon the Council's work who were receiving less than 6d. an hour. To this Messrs. Mowlem, under date February 11, 1891, replied as follows—'We submit that the questions asked are such that we cannot reasonably be expected to answer. The letter we wrote you on December 18 explains the position we then thought right we should take up, and we do not see that we can take any other view now.' We have had Mr. Humphrey before us, and he has informed us that to his own knowledge thirty men were at the time of his visit to the works on November 22, receiving 5½d. an hour, and that many of these were discharged on that day. He further, at our request, gave the names and addresses of four of these men, and stated that he could give the names of many more, but, for certain reasons which will be readily understood, withheld them. Mr. Humphrey further informed us that 6d. an hour was generally looked upon as a fair rate of pay for able-bodied unskilled labourers. Messrs. Mowlem & Co. were informed by letter that this complaint would be heard at the time and place specified, and were invited to attend. No one appeared on their behalf. We consider that the facts above set forth show that Messrs. Mowlem & Co. have not kept to the terms of their undertaking 'to pay such rates of wages as are generally considered fair in the trade'; and we recommend—

'That Messrs. Mowlem & Co be informed—That in the opinion of the Council they have, in paying the labourers employed on the works of the Council under the Cable-street scheme at a less rate than 6d. an hour, departed from the terms of the declaration made in their tender, that they 'pay such rates of wages and observe such hours of labour as are generally considered fair in the respective trades.'"

The recommendation was agreed to, after considerable discussion.

The Main Drainage Question.—The Main Drainge Committee presented the following report:—

"We have received the joint report of Sir Benjamin Baker and the Chief Engineer, prepared in pursuance of the instruction of the Council of December 17, 1889, upon the main drainage system of London. The report has been circulated amongst the members of the Council, and is receiving our

careful consideration. We are not, of course, in a position at present to deal with all the important recommendations contained in the report, but as regards that portion of it which gives an approximate estimated cost of the proposed works for improving the existing system of main drainage on the north and south sides of the river, we are of opinion that these are of so urgent a character that no delay should take place in acting upon them. We therefore recommend,—

'That detailed plans be prepared of the new sewers on both sides of the river as proposed by Sir Benjamin Baker and the Chief Engineer of the Council in paragraph 10 of their joint report upon the main drainage of London.'"

On the motion for the reception of the report, Sir Walter de Souza asked a question of the Chairman of the Committee suggesting whether, instead of constructing one of the proposed new sewers, it would not be cheaper to enlarge the Oxford-street sewer; and whether the latter course might have been ignored as likely to interfere with the proposed Central London Railway.

Mr. Howell Williams, the Chairman of the Committee, said that he was informed by the Engineer to the Council that the enlargement of the Oxford-street sewer, even if the level and gradient of it were suitable,—and they were not,—would be much more costly than making a new sewer. He thought the latter part of the question was an uncalled-for reflection upon the good faith of Sir Benjamin Baker. In conclusion, Mr. Williams moved the adoption of the recommendation.

Mr. Bassett Hopkins moved an amendment referring the matter back to the Committee with instructions to obtain alternative estimates for the work on the basis of separating the rainfall from the sewage, but before the discussion had proceeded very far the consideration of the subject was adjourned.

Proposed Paving of the Victoria Embankment with Wood.—The Highways Committee presented a report of which one paragraph was as follows :—

"We have, in connexion with the question of the future maintenance of the embankment carriageway, considered whether, having regard to the large cost, amounting last year to about 3,100*l.*, of re-metalling, it would not be advisable to adopt some less expensive surface for the road. We have received from the Engineer a report stating that the annual cost of maintenance of the existing carriageway is 2s. 1d. per square yard, while the annual cost of wood-paving for the same area would probably amount to only about 1s. 11½d. per square yard, including the provision of a sinking fund to repay the cost of the wood in eight years, and of the concrete foundation in 30 years. He further states that when the cost of the foundation shall have been repaid, the cost of maintenance per square yard per year will be reduced by 2½d., and that in his opinion the adoption of wood paving would result in a present saving of £500 per annum in this item. The superficial area of the carriageway of the embankment amounts to 54,500 square yards, equal to a length of four miles of an ordinary 40-feet road; and the Engineer estimates that the cost of wood pavement for this area would be about 28,250*l.* He further suggests that if the wood paving be adopted, the work of laying it should be carried out in three sections in three successive years, in order to avoid, as far as possible, a prolonged interference with the traffic both in the first laying of the pavement, and in the execution of repairs which may become necessary thereafter. Having fully considered these statements, and estimates which have been laid before us of the cost of macadam as against other kinds of road material, we have come to the conclusion that it is advisable that wood pavement should be laid on the carriageway of the Embankment; and we recommend—

'That, subject to an estimate being submitted by the Finance Committee as required by the statute, the carriage-way of the Victoria-embankment be paved with wood at an estimated cost of 28,250*l.*; that the repayment of the cost of the wood be spread over a period of eight years, and of the concrete foundation over thirty years; that the work be carried out in three sections in three successive years; and that it be referred to the Highways Committee to prepare a specification, and to make arrangements for the execution of the works.'"

After a short discussion, in the course of which the proposal to pave the Embankment with wood was strongly objected to, on the ground of danger to horses, the report was referred back to the Committee for further consideration, a great deal of dissatisfaction being expressed at the proposal of the Committee.

After transacting other business the Council adjourned.

ERRATUM.—In our account of Salisbury Cathedral last week, a misprint escaped detection. In line 13, col. 3, p. 271, for "first work" read *joint work*.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION: ANNUAL DINNER.

THE thirteenth annual dinner of this Institution was held in the Great Hall of the Cannon-street Hotel on Monday evening last, Mr. Benjamin Hannen, jun., President, in the chair, supported by a large number of the leading builders of London. In all about 290 persons sat down to dinner.

The usual loyal and patriotic toasts having been duly honoured (Colonel Stanley Bird responding for the "Army, Navy, and Reserve Forces"),

The Chairman, in proposing the toast of the evening, "Prosperity to the Builders' Clerks' Benevolent Institution," said it was a great pleasure to him to be allowed to advocate the claims of so excellent an institution as that over which he had been called upon to preside, and he hoped that the result of his advocacy would be that they would obtain the necessary funds not only for maintaining their present pensioners, but for extending the benefits of the Institution to others. The clerks of the building trade were subject to greater vicissitudes than perhaps those in any other branch of trade, owing to the excessive competition of modern times, due to the overcrowded condition of the trade. Unfortunately that was the cause of the prominent position which the building trades occupied in the official returns of bankruptcy. It should be remembered that whenever a misguided or unfortunate builder met with a downfall, he dragged his staff down with him, and many were the cases of hardship arising out of such circumstances in which the Institution had been enabled to help the victims to tide over their difficulties. Such misfortunes as he had referred to came upon the provident and the improvident alike, and the persons sustaining them always received the sympathy and help of the Institution as far as possible. But how much greater even than in those circumstances was the need for help and sympathy when the breadwinner of the family was taken away, leaving a widow and children with little if any means of subsistence? In such cases the Institution had done great service in stepping in to the relief of the bereaved ones. From personal knowledge of the careful way in which its affairs were managed, he was quite sure that the funds entrusted to it were carefully and judiciously, as well as most economically, administered. The Committee were most vigilant in selecting the most deserving cases for help. During the twenty-six years it had been in existence the total amount distributed by it in pensions, temporary relief, and presentations to orphanages was 5,343*l.*, and of that amount 4,558*l.* had been spent upon pensions and temporary relief, and 787*l.* in orphan presentations. Each of the latter was tenable by the Institution for twenty-one years. Since the establishment of the Institution there had been thirty-two pensioners elected, of whom eighteen were at the present time on the books. Until lately there were three orphans supported on its presentations, but now there were four. The sum expended upon pensions had necessarily increased year by year from 12*l.* 15s. in 1868, to 385*l.* last year. While heartily commending the Institution to the support of the master builders and the building trade generally, he would make an earnest appeal to the builders' clerks themselves to join the Institution in larger numbers. They were the persons most interested in the Institution, after all, for it was formed to help them. They should really be its backbone, but that was far from being the case, for he was sorry to say that only a very small proportion of them were subscribers to its funds. He hoped that this state of things would not continue. If they combined together, they would be able to hold out a helping hand to their more unfortunate brethren in the hour of need, and would be able to have something substantial in it. (The toast was received very heartlly.)

Mr. G. H. Trollope next proposed "The Architects and Surveyors," coupled with the name of Mr. E. Franklin King, who briefly replied.

Mr. E. C. Roe, in a humorous speech, proposed "The Builders," coupled with the name of Mr. H. T. Ashby, President of the Builders' Institute, who made an interesting and eloquent speech in reply.

Mr. T. F. Rider proposed "The President," and referred to the fact that the President's father, Mr. Benjamin Hannen, sen., had also filled the office of President of the Institution. The Chairman having replied,

Mr. E. Brooks (Treasurer) proposed "The Past Presidents," coupled with the name of Mr. Joseph Randall, who briefly returned thanks.

Mr. J. H. Colls proposed "The Visitors," coupled with the name of Mr. Stanton W. Preston, Clerk of the Carpenters' Company, who in responding described what was being done by his Company for the advancement of technical education, and defended the City Guilds generally.

Mr. W. R. Freeman proposed "The Committee," coupled with the name of the Secretary, Mr. H. J. Wheatley, who in responding, announced lists of subscriptions and donations amounting to a total of 412*l.* 9s. The President's list alone, it should be mentioned, amounted to 285*l.* 13s. 6d.

CLIFF TRAMWAY-LIFT, HASTINGS.—We gave a description of this in our last (p. 277). We are asked to add that the glass roofs are being glazed on Mr. T. W. Helliwell's patent system.

THE SANITARY INSPECTORS' ASSOCIATION.

AT the April meeting of the Association of Public Sanitary Inspectors held at Carpenters' Hall, London-wall, on Saturday last, the Chairman of the Council, Mr. Hugh Alexander, announced that articles of incorporation had been adopted by the Council, and that in the future the Society's official title would be "The Sanitary Inspectors' Association."

Mr. Alexander also announced that the change of the official designation of Inspectors from that of "Nuisance Inspector" to "Sanitary Inspector" demanded by the Council had been conceded, and would be used in the new Public Health Act, the status of these officials being also on the point of being better secured by their being placed under the authorities of the Local Government Board.

The paper of the evening was one upon "Burial and Funeral Reform," read by Dr. Danford Thomas (Coroner for Central Middlesex), the president of the association, Dr. B. W. Richardson, being in the chair. The lecturer advocated early burial, the practice of France, most hot countries, and of the Jews being in his opinion far more hygienic than the haphazard methods of our own country. The welfare of the living was the greatest consideration, and it would undoubtedly accord best with that consideration if we obeyed the injunction of the Jewish law, "Let not the sun go down twice upon thy dead." Dr. Thomas advocated "earth to earth" burial in preference to cremation, but only one should occupy one grave, the coffins ought to be readily perishable, and suitable ground only (dry and sandy and not wet or heavy soils) should be used for burial purposes. "Go to the ant, thou sluggard," was an injunction the wisdom of which was wonderfully illustrated by actual observations of the burial practices of a colony of ants. Immediately after the death of any member of such a colony the survivors would be found assembling, forming procession, marching to an appropriate sandhill, and depositing decently and reverently their dead, each singly in a separate grave. Next to quick burial, the most important reform to be aimed at was the abolition of extravagant expenditure upon funerals. A memorial invoking legislative interference for the purpose of securing burial and funeral reforms had been presented and had met with a reception so favourable as to justify the expectation that success in that direction would before long reward the efforts of sanitary reformers if they were unitedly and perseveringly put forth. The following were the main points they should endeavour to secure by legislation: 1. That the interests of the living should be chiefly considered. 2. That burial should be timely, and never, unless for ample reasons, be delayed. 3. That coffins should be readily perishable; and (4) that suitable ground only should be used for interments.

A discussion followed upon a resolution of thanks to Dr. Danford Thomas, moved by Mr. Alexander, and supported by Messrs. Tidman, Fairchild, Dee, Richards, Jordan, Coulson, &c., and the President, who wound up the discussion. All the speakers agreed with the lecturer's condemnation of extravagance in funeral expenditure, and in the necessity of considering, before all things, the health of the survivors, but cremation was thought preferable by some of the speakers. Mr. Richards, who had expected to find Dr. Thomas strongly advocating the compulsory removal of corpses to mortuaries, expressed disappointment at no reference being made to the point in the paper. Mr. Coulson raised a laugh by suggesting the utilisation of corpses in the formation of breakwaters, or the employment of the residuum after cremation as guano, or for other useful and practical purposes. Dr. Richardson, while admitting that "earth-to-earth" burial was perhaps the most natural, gave the preference to cremation, these two being practically the only alternatives possible at the present time, although one famous sanitarian, the late Dr. Parkes, had strongly advocated sea burial. He was not in favour of the immediate burial advocated by Dr. Thomas, but he was heartily in favour of the compulsory removal of corpses, soon after death, to public mortuaries under the control of the Vestries. It was a remarkable fact that he (Dr. Richardson) had never known a case of real contagious disease being contracted from a corpse, neither had he been able to verify any such case even after diligent enquiry from many undertakers.

A cordial vote of thanks was passed, which Dr. Danford Thomas briefly acknowledged.

An important paper by the president will be read at the concluding meeting of the Session, on the subject of "National Main Drainage."

SOCIETY OF BIBLICAL ARCHÆOLOGY.—At the meeting of this society held on Tuesday evening last, Mr. P. Le Page Renouf, President, in the chair, a paper was read by Mr. J. Pollard on "The Baal and Ashtoreth Altar, discovered at Kanawat, in Syria, now in the Fitzwilliam Museum at Cambridge."

ROLLED STEEL GIRDERS.—We have received from Messrs. Skelton & Co. their list of sections of Rolled Steel Girders, with a table of approximate weights and limits of possible variation in section.

Illustrations.

FURTHER SKETCHES AT PETERBOROUGH.

THE two sheets of small sketches at Peterborough, by Mr. Arnold Mitchell, are given this week as a kind of pendant to his large view of Peterborough Cathedral published in our last number. They include various bits of detail in connexion with the Cathedral, as well as two or three characteristic architectural features in the town.

The set of sketches of which they form a part were issued some time ago by the artist as a small book of sketches near Peterborough, which had, we believe, only a limited circulation, and probably many of our readers will be glad to have them here.

HOLFORD CHURCH.

THE subject of this illustration exists in the the form of a very uninteresting building, almost entirely of modern date,—the only old features at present visible being some fifteenth-century window-heads and the voussoirs of a Decorated or Early English arch, recently discovered imbedded in the chancel wall, and re-built as a door to the vestry by the rector. The churchyard cross, shown in the drawing, is also ancient, but the present base and the cross at top are modern and entirely out of character with the old stem. These it is proposed to replace with others of suitable form founded on local ancient examples.

The new work proposed in connexion with the church consists of tower, north aisle, and porch, which, it was suggested, should be built as a memorial to the Poet Wordsworth, who lived for two years in the vicinity. The existing tower contains nothing whatever of interest, and is a stunted "saddle-backed" erection, rough-cast and slated, built somewhere about the middle of the last century, and the present porch is equally mean and modern. The only old feature of the north wall is one of the window heads before mentioned, and this would be rebuilt in the new aisle wall. Local character has been aimed at in the designs for the tower and new work generally, the former being modelled on the lines of that at Ruishton, in the same county, where the present Rector of Holford was brought up. The design has, however, been very freely treated in order to bring the new tower into scale and harmony with the existing building. The materials proposed to be used are Ham-hill Stone for the dressings, and blue lias and the local red rubble for the walling.

Mr. P. M. Johnston, of London, is the architect for the work.

THE NEW "WERDER-HAUS," BERLIN.

IN this number we give some illustrations of the newly-erected business premises which have been placed on one of the most advantageous sites of Berlin by the "Werder-haus" Company, whose aim it has been to give the capital some dignified accommodation for better-class shops and offices.

In accordance with the wishes of the managers, the extensive corner-site has been divided into five distinct blocks, each of which, though carried out on one and the same principle, forms an entirely independent whole; this separation, which it will be observed is duly recognised in the exterior design, having the purpose of facilitating the sale of the property if required.

The buildings having been intended for business and office purposes, the usual feature in Berlin of having residences in the upper stories has not been adopted, as such an arrangement would have had an undesirable influence over the planning of the far more important and valuable floors below.

Special care has been taken by the architect to have the different flats as open as possible, no subdivision into passages, rooms, &c., having been constructed; any such partitions as might be required by the tenant being of light framework, easily movable, to suit the occasion. As to communication between the different floors, it may be well to mention that, besides the well-lighted main staircases, secondary ones (leading from courtyard to attic) have been placed on the different blocks; that, to facilitate this communication, thirteen lifts are to be found on the site, five for passengers, the rest for goods; and that the possibility of forming internal staircases has been duly considered for the case of any one tenant desiring to take two flats one above the other.

From the constructive point of view there is nothing worth special mention. As regards the foundations, it has been found necessary, on account of the high ground water level, to have a layer of concrete spread over the whole site, and a plentiful use of cement has been made in carrying up the lower parts of the brickwork. Heating and ventilation are of a simple kind; no measures besides those required by the building regulations have been taken to ensure protection from fire. The lifts are worked by water-power, each of the blocks having its own motor for pumping purposes. The façades are built of freestone in combination with iron construction, these façades being built in accordance with the local building regulations as to height and projection of cornices, &c. The whole set of buildings have been erected in the short space of eighteen months (at a cost of 1,639,000 marks), according to the designs and under the superintendence of Regierungs Baumeister Alfred Messel.

COTTAGE HOSPITAL, STANMORE.

THIS hospital, which is built of red brick and tiles, is the gift of the late Miss Wickens to the village of Stanmore; it has been erected at a cost of about 2,000*l.*, and is capable of receiving eight patients. The wards and offices are separated from the administrative portion of the building by a cross ventilated octagon; there is also a dispensary and operating-room, and upstairs is a large and well-lighted convalescent hall. Mr. John F. Curwen, of Kendal, is the architect; and Messrs. Kirby & Sons, of Stanmore, are the builders.

THE USE AND ABUSE OF SKETCHING AND MEASURING.*

FIRST, I would ask you to consider what is the object of sketching and what position it ought to occupy as part of our professional training? This was so clearly laid down by Mr. Street, in one of his lectures at the Royal Academy, that I feel I cannot do better than quote his words. He said:—"As there is no sort of training for an architect equal to that of the study of buildings, so it is absolutely impossible for you to learn your art only from the lessons which we are able to teach you here, or which you learn in the routine of an architect's practice."

Further on he said:—"If you have any feeling of the artist in your composition it will be impossible for you to go on for long drawing the good work of other men or other times without gradually finding yourselves distinguishing clearly between good, inferior, and bad work;" and, as a justification for this view, he said: "We know of no period in our art in which architects were not studying the work of men who had gone before. They studied them wisely, so that they might improve them."

I think we may take it, therefore, that the object of measuring and sketching old work is:—

1. To train the mind and eye to what is refined and artistic.

2. To study the mouldings and details by which such effects are produced.

3. To observe the proper uses and functions of different materials, and the best means of combining them for artistic effect.

4. To examine the jointing, bonding, and constructional methods by which the various parts are fitted together.

5. To practise drawing these buildings in perspective, in order that we may be enabled to think in perspective when called upon to design ourselves.

Now, if we bear these objects in mind, they will, I think, afford us much assistance in arriving at a right conclusion as to what we ought to sketch.

But just as the mind is refined by the constant study of good work, so to be continually in the presence of coarse or vulgar things tends to blunt the æsthetic sense, and it is, therefore, most important that the young student should learn as soon as possible to distinguish good from bad work, to study the one and to avoid the other. And this is one of his first difficulties.

Before he has learnt to separate the wheat from the chaff for himself, he will find the assistance of some more experienced companion of the greatest value, and I should, therefore, always advise a young man when first commencing to sketch to endeavour to go out with others older than himself, who can both assist him in the selection of suitable subjects, and show him how to set about drawing them. Such assistance, if given by a competent adviser,—and there are many such to be found,—is simply invaluable, and, after a little practice, coupled with the knowledge to be obtained from books and other sources, a young student will soon be able to discriminate for himself between what is worthy of being committed to the sketch-book, and what is not. With this object, the London Architectural Association have recently established a class for the study of measuring and sketching, which is carried on by means of visits to buildings in and around London on Saturday afternoons, and at which some of the older members attend as visitors for the purpose of giving their younger brethren the benefit of their advice and co-operation. Although only instituted last session, it has already proved a great success, and there can be no reason why such a class should not be established in Birmingham with similarly happy results. Above all, when first commencing, it is necessary to avoid attempting too ambitious subjects, for there is much more to be learnt from doing something small thoroughly than by attempting something far beyond one's powers, besides which, nothing is more disappointing than failure. It is a very common mistake with the young sketcher to think anything smaller than a whole cathedral beneath his notice, but he will generally find as he gains experience that there is more to be learnt from the careful study of smaller and less important subjects when thoroughly investigated than by making light and airy presentments of huge buildings which are drawn to too small a scale to give any idea of the detail or decorative features. I commend the remarks of Mr. Waterhouse in his opening address at the Royal Institute of British Architects this session to your notice in this connexion. He said: "The student nowadays seems sometimes possessed of the restlessness begotten of the locomotive engine. He stays, it may be, but a day in a place; in that day, to be sure, he does a marvellous amount of sketching, and he continues to visit in the time which he has to devote to his studentship an astonishing number of interesting buildings, the most salient features of which he transfers to paper. I do not see, however, as often as I should like, that the student has sat down before a building to lay siege to it with the determination before he has done with it to make it his own, to enter into the spirit of its builders, and to seek to discover their way of arriving at the ends they had in view." I do not think we ought to infer, however, from these remarks that a student should never study the general grouping and massing of buildings when he has reached that point in his career to enable him to do so with advantage, but I think there can be no question that a general and superficial study of buildings is a useless if not a dangerous style of drawing for a young student to adopt, for it induces a habit of carelessness, and a disinclination hereafter to thoroughly dissect a building and ascertain the means by which the effect which charms him was produced. For a painter it may be sufficient to see and appreciate the beauty of a building as it appears before him, but for an architect, if he wishes to emulate the achievements of those who have gone before him and to learn from their works, he must do more than this,—he must endeavour to find out how it was done, and that can only be accomplished by careful study of their work and the materials they used.

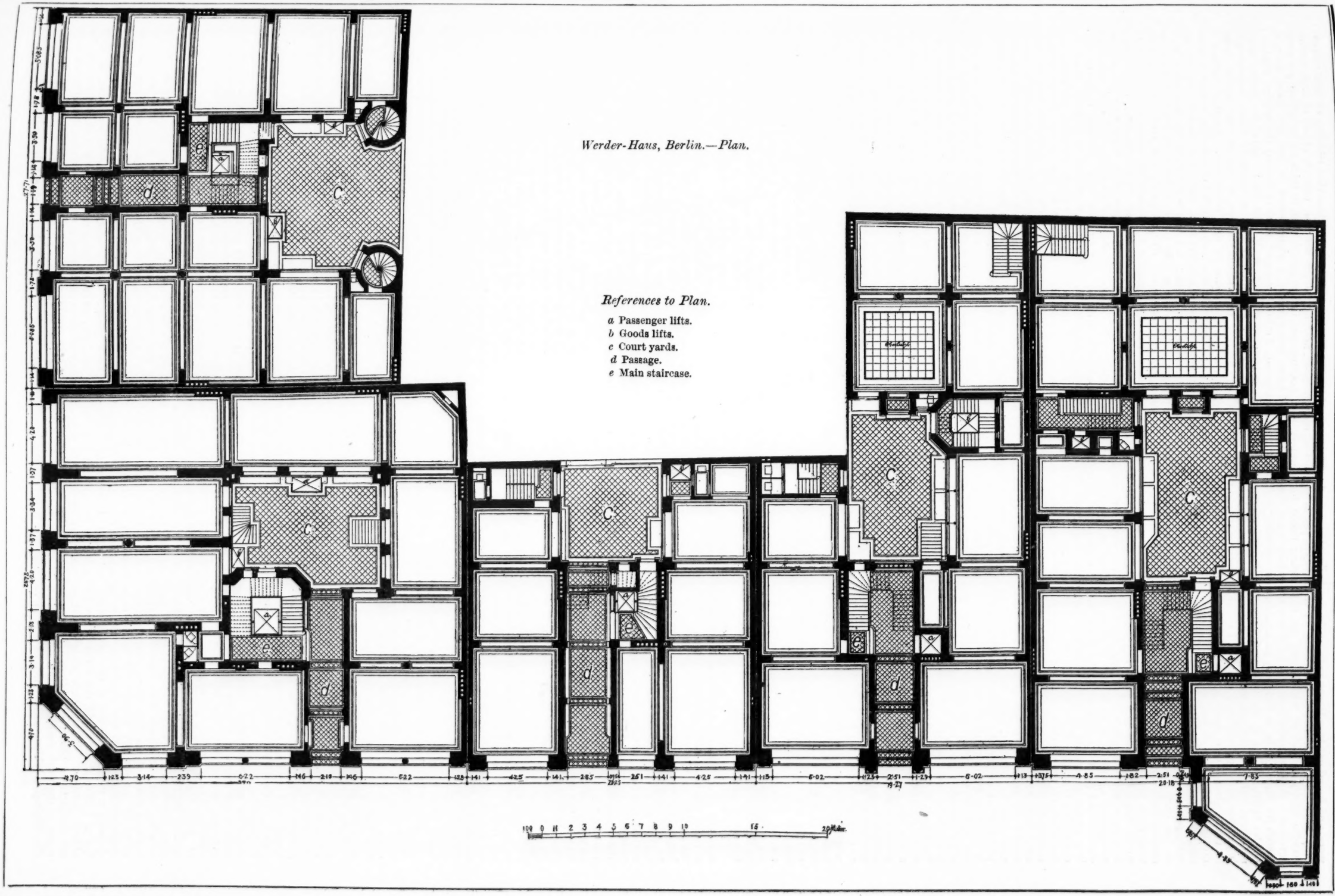
As to how we should sketch; the means which are usually employed at the present time for studying old work are by measuring and drawing to scale, by perspective sketching in pencil only, in pencil combined with light washes of colour, in water-colour, in chalks, and in pen-and-ink, and by taking rubbings. Now, all these various methods have their various uses and are suitable to special classes of work, and I propose to deal with them *seriatim*, pointing out, as far as I am able, the uses and limitations of each. Measuring and drawing to scale must be regarded as the best and most valuable of all, for by no other method can we obtain so complete a mastery and knowledge of the means employed to produce certain effects, or of the various constructive devices by which such effects were carried into execution, and I think it is not too much to say that until a student has in this way pulled a building to pieces, as it

* A paper read a short time since before the Birmingham Architectural Association, by Mr. H. O. Cresswell.

Werder-Haus, Berlin.—Plan.

References to Plan.

a Passenger lifts.
b Goods lifts.
c Court yards.
d Passage.
e Main staircase.



were, and found out how it was built up, he can only have but a superficial knowledge of the secrets which lie hidden within, and are only revealed to those who will carefully and diligently search for them; he is, in fact, only an amateur, not an artist. What is the best way, then, to set about making measured drawings of a building or portion of a building? At first I should, as I have already said, select a small building,—no matter how small so long as it be good,—and do it completely. If such is not available, take some portion of a large building which is more or less complete in itself, such as a porch, a chapter-house, or a tomb even, if it be ecclesiastical work, and show its position in and relation to the whole by means of a small key-plan. If it be domestic work you will find it more difficult to separate a portion, as each part is so dependent on and placed in relation to the whole that it is almost impossible to divide them without destroying the value of the lesson to be learned; but whatever you do, do it completely, and if you cannot do more than a door or a window, make sure that you have all the information that would be required if you had to reproduce that door or window, even to the hinges by which it is hung, or the fastenings by which it is secured, if they are of the same period as the rest of the work, or worth attention for other reasons; and it is advisable, wherever possible, to make a little thumb-nail sketch of the whole, or a sketch-plan showing the position of the door or window measured, and its height above the eye, otherwise your work will be in great measure thrown away. Nothing is more useless than a series of isolated scraps, such as portions of arcades, windows, &c., with nothing to show their relation to each other or to the whole, and when you have forgotten the exact position in which they were in the original work, they may be misleading even to yourself as they are useless to everybody else. If you cannot make a thumb-nail sketch you can almost always get a photograph, which will serve the same purpose, though it is preferable to sketch it whenever it is possible, the better to impress it on your memory.

After having selected a subject, I find the best way to set about measuring is first to make a small key-plan and elevation, which should be plotted on the spot, and need not be to a large scale, as it is only intended to form a key to your real sizes, and should only give such things as extreme length, breadth, and height, and should not attempt to show any detail. The next thing to do is to measure and draw the whole of the details full size on the spot, putting references from them to your key-plan as you go along, so that there may be no mistake as to where they are. This may appear at first sight to be "putting the cart before the horse," but you will soon find by experience that if you first measure and plot the whole drawing to the scale you propose to draw it, and then proceed to make your real-size details afterwards, you are doing the work twice over, first measuring the details and drawing them to scale, and then measuring them again to draw them out full size, but if you begin with the full size you are able to give the spirit of the mouldings much better when reduced to a smaller scale, because you know what you are drawing, and are not doing your measuring twice over. It will save much time also, and unnecessary running up and down of ladders, if two work together, taking it in turn to plot and to take the dimensions, so as to gain practice at both.

When you have got your mouldings real size, proceed to draw out the whole to the scale to which it is to be finished, which will vary with the size or delicacy of the work, but should always be large enough to show the detail clearly and intelligibly without crowding on the paper. This should always be done on the spot if possible, but in some buildings, such as churches and cathedrals, were it is only possible to work during a short time in each day, between the services, the best plan to avoid wasting time is to measure and draw as much of your real size details as you can in the church during the day, and to plot your small scale drawings from these details at home each evening, and to compare them with the original work on the spot the first thing next morning, so as to correct any errors. If this is done conscientiously it is the next best thing to drawing it in the presence of the actual work, but as I have already said, the other is preferable if possible. When these scale drawings are complete in pencil they should always be taken to the work, and carefully compared with the original, any decorative portions put in, or corrections made on the spot, and the joints always put in from actual measurement, nothing being taken for granted, and nothing put in which is not there. There is no harm, however, in restoring portions which are injured, if other similar features exist, so long as it is noted on the drawing that they are restorations; but no features should be put in from mere hearsay, or even documentary evidence, unless you can find absolute warranty of what was there before. Any additions of a date subsequent to the period of the work you are measuring, and which cover portions of it, or replace old work now destroyed, must be measured, but are best drawn only in outline, to show that they are not part of the original design, and the fact that they are modern should be noted upon them to prevent any misconception. It is always useful to try and find the exact date of the work, and any other particulars concerning it of interest, such as the name of the artist, and the reason for its erection. If you propose to limn your drawings in pencil you must be careful to keep them clean and sharp while working on them, and not to use too hard a pencil, the sectional parts should be tinted with pale ink or colour. If you ink them in you must adjust the thickness of your lines to the scale and class of work, avoiding pitch-black ink, either for your lines or your sections, but more particularly in the latter, for you will find that large masses of black will attract the eye away from the more interesting portions of the work, and give undue prominence to what is of no real importance, and will, in fact, "kill" a delicate drawing. It is not absolutely necessary to use black for either your lines or sections, and some drawings look better in brown or other colours, with sections tinted in a neutral grey, but if you adopt this style of drawing you must adapt it and vary it to suit the particular subject, and, on the whole, you will find it best at first, at all events, to stick to black, so long as you can find it in your heart to depart from the old-established custom of laying on your black so thick that it shines like varnish or Wellington boot-polish.

One word as to the writing, or, as it is more commonly called, printing. Let it be clear and legible, and adapted to the scale of your drawing; but do not waste time in the imitation of all sorts of old fancy types, which are probably quite different to the style of the work you are illustrating, and are mere pedantry at the best. Put your title in a prominent position—the top left-hand corner for choice—and make it larger and more important than the rest, so that it looks like a title. Draw on a scale as well as writing it in words; this you will find most convenient for reference hereafter, and, if at any time you wish your drawing to be reproduced by photo-lithography, will be absolutely necessary. If you must have a line round your drawing to finish it, let it be a single line only, and not too thick; and, above all, avoid the style of decoration at the corners with which we are all so familiar on the lithographed plans of auctioneers, or, indeed, anything of the sort. They are not only mere waste of time, but are useless and vulgar to boot. These may seem trivial matters, but I can assure you that they are by no means imaginary errors, as, from my connection with the A. A. Sketch-Book, I can testify, and, if such trifles were more often attended to, the work of the editors would be considerably lightened.

Having thus completed the whole of your geometrical drawings, you should not consider your work finished until you have made a small perspective sketch to show the general effect of the whole; and you will also find it extremely useful to keep a small sketch-book always at hand while you are measuring, in which you can note any scraps of information, inscriptions, or perspective sketches to show points of detail which cannot be clearly shown in the measured drawings.

A word as to the instruments required. Two 5-ft. rods, a 2-ft. rule for small dimensions, a tape, and a plumb-bob, are all that you will require for measuring, while a common pair of mason's compasses, with the legs bent in a bow shape, will be useful for taking the real sizes; but it is important to remember that by far the best way to draw moulds is to train your eye and hand so as to dispense as far as possible with instruments at all, taking only such dimensions as are necessary to test the accuracy of your drawing; but to depend on any of those complicated instruments which are now made for reproducing a moulding by mechanical means is, in my opinion, a great mistake, as in this way you lose that training of hand and eye which are the primary object of such studies. Be careful that, in taking a moulding, you do so in a place where it has not been worn or damaged, so as to destroy the original contour; but if it has been anywhere broken right through with a tolerably clean fracture this will enable you to see its true section better than in any other way. Another method is sometimes adopted of inserting a piece of paper edgeways in a joint, and then tracing the outline; but this is not to be recommended, as, in the first place, it has a tendency, if done too often, to damage the old work; and, secondly, because it is somewhat mechanical. With reference to the first objection, it is hardly necessary to say that, when you are allowed the privilege of measuring old work, you ought to exercise the very greatest care, so that nothing you do should in anyway cause the slightest injury to the work you are measuring. This, I regret to say, is not always borne in mind as carefully as it should be, and has been the cause of *bonâ-fide* students being sometimes denied facilities for measuring certain buildings where damage has been caused by others who preceded them.

Next in importance to measuring, as a means of studying old work, comes sketching in perspective, or perhaps it would be more correct to say, equal in importance, for one is a corollary of the other, and neither is complete without the other; and nothing more absurd could be imagined than the acrimonious discussions with which we are treated from time to time on the rival merits of measuring and sketching; just as though the two were in any sense antagonistic, and the practice of both was not essential to enable us to obtain anything like a complete grasp of the feeling of old work.

Sketching in pencil, pure and simple, is probably the means which will be adopted by most students at first, and I do not know that they could choose a better. For, in addition to being a rapid, simple, and portable means of drawing, for architectural purposes it has few, if any, equals, and in the hands of an expert draughtsman, the results to be obtained from it are multifarious.

Of course, as a preliminary to sketching, a student should first know something of the laws of perspective, so as to enable him to know how to draw correctly; for though sketching is an art only acquired by constant practice, yet perspective is a science, governed by fixed laws, and unless he has studied the science first, he will never succeed at the art, and his practice will be time thrown away. I do not say that everyone who is conversant with the laws of perspective must draw correctly; far from it; but it is evident that a man who knows nothing of perspective *cannot* draw correctly; therefore a knowledge of perspective must be regarded as the basis of and preliminary to the art of sketching.

For materials I think you will find smooth paper,—such as Whatman's hot-pressed,—and a rather soft pencil, about H B quality, the best. The smooth paper takes a clean firm line, and the softness of the pencil allows you to work with facility without damaging the surface of the paper,—a great desideratum. A small board, a wood frame, or a sketching-block, will be found the best to work upon, but T-squares and set-squares should be eschewed as far as possible, and the hand trained to do without them. Another thing to be avoided is india-rubber. It should be used as little as you can, for its absence will inculcate a habit of considering what is the meaning and function of every line before putting it in, and this is the test of good sketching.

When you have accustomed yourself to sketching without india-rubber, you will find the smooth-faced metallic paper very delightful to work upon, and lines drawn upon it have the advantage of being indelible; consequently there is no fear of your sketches rubbing in the portfolio; but on this paper a line once put in cannot be rubbed out without damaging the surface; hence you must make up your mind exactly what you are going to do before attempting to do it. It is more suitable for sketching than for finished drawings, as lines cannot be worked over more than once with advantage, nor is it suitable for colour-washes.

It is advisable, especially at first, to draw everything to as large a scale as you can, for in addition to the sketches being much more valuable to you afterwards, you gain a much greater knowledge of the detail by this course, and this knowledge will afterwards enable you

when sketching on a smaller scale to give by a few lines the spirit and effect of a collection of mouldings, which you would not have been able to do had you not studied those mouldings on a larger scale first, and it is just this power of seizing on the necessary lines and omitting the unnecessary ones which is the chief test of good draughtsmanship.

This is a matter of practice, however, and at first you should strive to make your drawings plain and straightforward representations of what you see before you, not seeking to imitate the little tricks and dodges which you may discover in other men's work, for when they are not your own and the result of experience, they are mere affectation, and will always appear as such on your drawings. In time you will develop various little mannerisms, quick ways of obtaining certain effects, almost unconsciously to yourself,—in fact, a style of your own, founded on your own observation, the result of your own experience. And whether this style be a good or a bad one depends very largely upon the care with which you sketch in your early days. Other men's drawings should be studied at this period, not to copy or merely to criticise, but with the earnest desire of discovering how they obtained their effects, what it was they intended to convey, why they did it in a particular way, and if it was the best way possible under the circumstances.

A style of drawing has of late been developed by some men, which has, in my opinion, much to commend it, but which, if adopted by others in a mere spirit of copyism, and without grasping the objects or limitations of the style, would, I feel sure, result in failure. I refer to the method of using slight washes of colour or monochrome in conjunction with pencil sketches.

It has several advantages, among which I may mention that it may be used to suggest the colours of the various materials of which the building is constructed, or to give force to certain portions of it, and is a rapid way of showing large masses of shadow. It also has the practical advantage of "fixing" pencil sketches, so as to prevent their rubbing; but with those who use it most successfully it is made merely a conventional representation of the colours and values of the different parts, and no attempt is made to give the real force and strength of the colours or shadows, or, in short, to make it a picture, in which grouping, balance, and composition would have to be considered. But a tyro seeing some successful drawings made in this manner and anxious to copy their style would find it very difficult to know where to draw the line between mere conventional representation for architectural purposes and the attempt to produce a picture. Not knowing the full force and significance of his colour washes he would probably find he had given importance to what should be subdued, and left in obscurity what should be forced. I mention this as an example of what a dangerous thing it is to adopt the style of another man, unless you know precisely what were his intentions or his reasons for working in a particular way, and consequently that any of these new methods should only be taken up with caution, and a full knowledge of what you are about. At first I should say, stick to pencil work.

The question has often been discussed as to whether sketching in water-colours is of any practical use for architectural purposes, and those who practise this class of drawing are often accused of being mere picture makers. Now, if you will consider again for one moment the proposition we started with, viz., what is the object of sketching? and if you admit that the solution given of that proposition was a correct one, I think you will have no difficulty in finding an answer to the question. The third of those objects was "to observe the proper uses and functions of different materials, and the best means of combining them for artistic effect," and I would ask how is it possible to study that most important factor in all architectural effect, viz., colour, unless your drawings of such effects are made in colour, and what better method is there of representing the poetry of light and shade on a building than by the broad washes which show what is in shadow and what is in light, and give the true balance of voids and solids? It may not be so important in our cold northern clime, where the sun is so chary of visiting us that we are thankful even for an occasional glimpse of it, but to draw the front of an Italian church, without giving the effect of the cast shadows, would convey but a very false impression of the original, and would be very much like the pieces of music which one sometimes hears played, all *forte* and no *piano*. I think, therefore, there can be no doubt that sketching in water-colour, if properly carried on, is most unquestionably of value to an architect, but I will not go so far as to say that it is essential. When I speak of water-colour sketching, — "properly carried on" — I mean that the author should not merely seek to transfer dashy effects of colour to paper with no reference to the form or material of which it is constructed, but that he should strive as nearly as he can to represent both the form and colour of a building, and the play of light and shade produced by its mouldings and other features; nor should he be content with this, but should always make small sketch sections of the mouldings or other features to supplement his water-colour drawing. Carried on in this way I think water-colour may be a most valuable means of study to an architect.

As to how far, however, an architect should go in the direction of making his water-colour drawings artistic compositions or pictures must depend upon the individual taste and ability of the artist. This much can be said with certainty, that it is quite possible for him to be a thoroughly competent architect without such a power, but if his tastes do lie in that direction, by all means let him cultivate them, for such an accomplishment must have a refining influence upon the mind, and will accustom him to see and think as an artist when he is designing.

There is an additional reason why water-colour sketching should not be neglected by the architect, and it is that it forms a means of studying the polychromy of old buildings and their surroundings, instead of restricting one's self to their form alone, as many of us are too apt to do. Colour is a subject with which every architect is called upon to do something sooner or later; whether it be in so arranging the stone and brick or other materials of which a building is constructed as to form an agreeable combination externally, or in selecting such a colour for his wall-papers or his paint as to give a comfortable and harmonious effect internally; and how is he to execute this part of his work properly if he has never thought it worth while to study the important part that colour plays in all works of art? The whole effect of the architecture of a building may be altered, either for better or worse, by means of colour applied to it,—its very proportions may be made to look different,—surely, then, some insight into the laws of harmony, contrast, and complementary colours would appear to be a necessary part of an architect's education. Since writing the above, Mr. Waterhouse has chosen this subject for his address to the students at the Royal Institute of British Architects.

Chalks or crayons will be found useful for some classes of drawing, more particularly for sketches of carved ornament in the round or in relief sculpture, and other decorative work. The modelling can be more easily shown, and with greater delicacy and gradations of shadow more truthfully rendered by using chalks than is possible with pencil, which is not sufficiently free for this class of work; and here, again, the colours may be judiciously selected to suggest the material of which the original is made. Probably the best way of studying ornament of this description is by modelling it in clay, but one has not always the facilities when on a sketching tour for obtaining the necessary materials or for transporting the models when made.

Pen-and-ink drawing as a means of illustrating architecture has of late become very popular, owing, probably, to the fact that by the improvements in the various processes of reproduction large numbers of copies may be easily and cheaply obtained, and for publication, of course, this is of great importance. In the hands of some of its best exponents the effects produced are bright and sparkling in the extreme, and the cleverness with which the different parts are made to stand out from each other, by the alternate use of dark upon light and light upon dark, gives an interest and variety to the drawing which is very charming; but we must not deceive ourselves into the belief that these are architectural drawings, or of any great value to the architect as studies of old work. In that they interest the public, and so popularise our art, they are or may be of great value to us indirectly, as showing the poetry which an artistic eye can discover in what to many is only so much bricks and mortar, but they are not the means by which a young student should attempt to study his art in the first instance,—something much more painstaking than this is required, if we wish to become competent architects. In saying this I am only referring to the advisability or the reverse of adopting such a style of drawing as a means of studying architecture, and I do not wish for one moment to decry the value of sketches in black and white for illustrating some of the most interesting examples of our art, or the pleasure which we derive from their contemplation, but I simply wish to point out that it is not by such means that a young man should expect to learn very much of the details of his craft. Taken alone, it may make him an architectural artist, but it most certainly will not make him an artistic architect.

There is one direction, however, in which this class of work may be of use to us. Many young men at the commencement of their careers are in the habit of making perspective drawings for their older or more successful brethren, who have not the time or inclination to make them for themselves,—and, shall I say, in some cases have not the power to do so either. If it should fall to a young architect's lot to have this class of work to do, a study of some of this black and white work by such men as Joseph Pennell, Herbert Railton, Raffles Davison, and others, will be found of the greatest advantage, as it will enable him to see how an architectural artist looks at and interprets architecture, as opposed to the way an architect looks at the same thing. And one of the first things he will have to learn as an architectural artist, will be that he must not attempt to put in every moulding and every detail because he knows it is there, but must strive to obtain some definite effect, and learn how much he to must leave out to obtain it. To think more of the masses and less of the lines. But this is straying somewhat from the realms of architectural sketching into that of architectural drawing.

I have only one more method for studying old work to examine,—viz., that of taking rubbings. This is used principally for reproducing brasses, inscriptions, or very flat enrichments, and is done, as you probably all know, by means of laying a sheet of continuous cartridge or lining paper over the object to be rubbed, after having first carefully cleaned off any dust or grit from the surface, and then rubbing over the paper with heelbore. It is very seldom that you will be able to obtain a perfect reproduction in this way, as some of the relief will be often injured or too low to "take" perfectly, and these must be put in by hand afterwards; unless, too, it is made merely for the purpose of reducing to scale as part of a measured drawing, you will find it a good thing to black in all your darks so as to obtain an even tone, and to mend any defects in the rubbing. You should also take a few particulars in your note-book of the tomb or other object it is from, to show its position with reference to the whole, and make a small perspective sketch of it. Any heraldic emblazonments or coloured enrichments should also be noted. There are two objections to this class of study,—the first is, that it is apt to become mechanical and brainless labour, from the manner in which it is done; and, secondly, that when done, it shows the object exactly as it is isn't,—if I may use such an expression. That is to say that, like the negative of a photograph, all the darks are lights and all the lights are darks, and consequently in referring to it afterwards we do not obtain the true effect of the original.

Now both these objections may be obviated very simply, but I regret to say that they very seldom are in actual practice. If after the rubbing has been made we were to lay it down and make an outline tracing of it, and then proceed to put a slight wash of colour over the ground, so as to bring out the pattern as in the original, we should obtain a true effect and at the same time draw in the ornament by hand, instead of having mechanically reproduced it.

I have now glanced at the uses of sketching, and the methods usually employed for carrying them into effect; it only remains to say a few words before I conclude upon some of its abuses, for sketching, like many other good things, is liable to be abused, and very often is so.

In the first place, sketching should never be

taken up with the mere object of making a collection of pretty bits, to be afterwards introduced into your own designs and palmed off on a confiding client as your own work; it should not be used for cubbing, in short; if that is your object, you had far better burn your sketch-books and throw away your measuring-rods at once, for you are not an artist but a mere copyist, and are indulging in a pernicious habit, which is certain to result in failure. Dealing with this question in the same lecture to which I have already referred, Mr. Street said,—"I would never have you draw and sketch existing examples with a view to copying or reproducing them. That is wholly contrary to right principles. What I wish is that you should draw so much of them as to find yourselves penetrated with the feeling of architectural form and perfection which, as the results of centuries of development, have been discovered to be the best; and you are to use them, not that you may steal from them, but that you may be able to deal with the problems that come before you with the same spirit and power that they show, whilst you avoid with care the failures and mistakes which you may discover in them." That is the spirit in which sketching should be taken up.

Another pitfall in the path of the young draughtsman,—aye, and the old draughtsman too,—is the habit of making careless or inaccurate sketches which only half explain themselves and leave you quite in the dark as to the details of mouldings and other features. Careless sketching is a most useless occupation, for it does not give you the very information which you, as architects, require, viz., the means by which the effect you admire was obtained, and when you refer to your sketch-book some time after to see how such and such a thing was done, it will only result in annoyance to find that you have not got the very information you require. But if careless sketching is useless, inaccurate sketching is dangerous; for this not only does not give you what you require, but misleads you into the bargain by showing a distorted representation of the real object, and will convey false impressions to your mind which are not easily removed. If the eye is to be trained by a study of old work it is essential that that old work should be correctly drawn, or, at all events, as correctly as you are able to draw it, not hurriedly and imperfectly. For this reason it is a bad thing to attempt to draw too rapidly at first — that will come with practice, — it is better to err in the other direction, making your drawings as simple and careful as you can; by this means you will acquire a better knowledge of what you are doing, and will be able in time to take a note of what you see rapidly, but effectively.

If you are only taking a pencil sketch, you will always find it usful to you hereafter to note down the materials and their colour, as, though you may think at the time that you will remember them, you will find after a year or two that without such notes all recollection of these things will have passed away, and your sketch merely speaks to you as it is. To obtain any real and lasting good from a travelling studentship, it is necessary to use your head as well as your pencil,—to think as well as to draw, while studying what is before you.

It is necessary always to bear in mind that sketching and measuring are merely a means to an end and not the end to itself, and should only be used with the object of obtaining a knowledge of your art, as practised by your predecessors.

An architect's sketches should, in the first place, be workmanlike, drawings for his own information and guidance, but they should be sufficiently clear for others to understand them as well as himself, if necessary. In making details all repetitions of similar parts should be avoided as unnecessary, and as savouring too much of mechanical perfection, and when once you have shown what there is in the design, leave it, after showing how the repeats occur. This is a matter in which drawings prepared for show very frequently err, from the reason that they *are* prepared for show and not for use.

There is one more danger to guard against in sketching, and it is that the constant study of old work is liable to make us more of archæologists than artists, unless we always keep before us the object of sketching, and I think that a useful antidote is to study at the same time some of our best modern work. As to now far an architect should go in the pursuit of archæology is a matter of taste, and it is a question upon which much diversity of opinion exists, but this I think I may say, without fear of contradiction, that, archæology being a science and architecture an art, we must not mistake the one for the other. The two are not antagonistic, so long as we keep the science subordinate to the art; on the contrary, archæology should be the "hand-maiden" of architecture, but once let our archæological researches outweigh our artistic instincts, and our work becomes mere dry bones and senseless copyism, without a vestige of originality to arouse the enthusiasm of those who come after us. Mere copyism may pass current as architecture for the time being, especially if it is correctly done, and shows a knowledge of the style copied; but succeeding generations, the fashion having passed away, will be able to appraise such work at its true value. Let us sketch, therefore, with the object of finding out how our predecessors achieved their ends; and, having done so, let us endeavour to do whatever comes to our hand to the best of our ability, with the object of making it as suitable for its purpose as possible, and so that those who use it may find pleasure in it. If we do this, no matter with what success, we shall, at all events, be consoled with the reflection that we have done our best,—and no one can do more.

Books.

Some Principles of Everyday Art. By LEWIS F. DAY. London: B. T. Batsford; 1890.

THIS appears to be, from the preface, a re-writing of a former work of the author's on "Everyday Art," to form an introductory volume to the author's "Text-books of Ornamental Design. He takes the view that "ornament is the art of every day." We may or may not go to picture galleries and such other shrines of art, but ornament, good or bad, is with us every day. The book has in fact a considerable similarity to the author's text-books; we meet with the same kind of illustrations, and the principles that are affirmed in the text-books are here affirmed in rather more general terms, but often in somewhat similar language. Considering, however, that Mr. Day everywhere upholds, in the literary part of his work, the standard of conventionalism, we are a little startled by the illustration of the very naturalistic example of ancient Etruscan gold work on page 33, as "Goldsmith's work of the best type." It is beautiful workmanship, no doubt, but far too naturalistic in feeling and form.

The truth about decorative painting (an expression often very carelessly used) is well stated on p. 40. "It is only on the summit of art that the pictorial and the decorative join hands. One may start with the idea of painting a picture, and end by making it conform to all that is necessary to decoration. Or one may begin with a decorative scheme, and carry it to the farthest point of pictorial perfection. Parnassus, that is to say, may be climbed from two opposite sides; and a man is classed as painter or decorator, not according to the height he may have reached, but according to the side from which he set out." There is a good deal of truth in this; a truth not always recognised. Very true also is the criticism on page 53, that "wherever a detail is to be repeated it is essential that the natural element in it should be toned down and made subsidiary to ornament:" a principle which is universally illustrated by all the repeated ornament which has by the common consent of mankind been regarded as the most successful. "Nature brings forth herbs and flowers answering to all human needs; but her scope does not include the art of domestic decoration." That is left for us to do, with the materials she furnishes.

In regard to the ornamentation of articles for practical use, Mr. Day says with truth that when a savage carved the handle of his tomahawk, the carving was just sufficient to give him a tighter grip of the weapon; "he would take very good care not to cut so deep as to weaken it," an æsthetic indulgence which might cost him his life. And so, as he goes on to remark, the only modern implements that are never overlaid with misplaced ornament are weapons, tools, things of actual use, which would be injured for their practical purpose by such ornament. The modern rifle is a more true work of art, in a sense, than the clumsy but elaborately carved arquebuses which find place in South Kensington Museum. This is our remark, not Mr. Day's; but it naturally follows from his principle.

All this has been said pretty often lately, but Mr. Day says it very effectively, and his illustrations are always apt, and (still greater merit) are nearly always pretty and attractive in themselves. We sometimes come across books on ornamental art in which the illustrations serve to explain the principles, no doubt, but also go to prove the melancholy truth that the possession of correct principles will not always prevent a man from making very bad drawings. Some few of Mr. Day's illustrations are not happy, but they are in a small minority. Most of them are a distinct pleasure to the eye as well as the judgment. Perhaps the very best of them is the bird sketched in brush-strokes (page 98).

Stable-building and Stable-fitting; a handbook for the use of architects, builders, and house-owners. By BYNG GIRAUD. London; B. T. Batsford; 1891.

THIS small book represents a summary of the author's practice rather than any attempt to show what stables should be on principle. Stables, we read, "are now constructed" in this or that way; whether this is the best way of constructing them the author does not apparently profess to say. The book is illustrated by a number of diagrams showing plans of stables, details of mangers and other fittings &c. These latter are useful, as they bring together a good many different methods of making fittings, and enable the reader to compare them with one another. Some of the remarks as to modes of building construction do not apply to stables any more specially than to other buildings, and hence are rather wasted in a small book intended to give special information. And in general the plans given are somewhat commonplace and much open to improvement; they may be useful to an architect in suggesting arrangements for the economical housing of horses, but they are arrangements often capable of being much improved upon. It may be questioned, indeed, whether practice in building for such clients as large omnibus companies and other employers of a number of horses for trade purposes is by any means the best school for stable building; economy of space and construction is sure to be made such a prominent consideration in these cases. A country gentleman who found his small stable for four horses planned as in plate 11, with the harness-room opening out of the end of the stable, would probably complain of his architect for an arrangement which would not allow of the harness being kept in the best condition. A harness-room should always have a double-door or lobby interposed between it and the stable, one of them a swing door, so as to cut off the connexion, where the harness-room entrance is not a separate one altogether; otherwise the harness will not be preserved in that bright condition which the private carriage owner demands. The rough ways of an omnibus company's stables, where, as the author tells us, the harness is hung up alongside the horse, are no school for private stable-building. This defect occurs in nearly all the plans shown for private stables. As a general rule, again, stable doors are made too narrow, and are often placed in such positions that the horse has to be twisted about in getting from his stall and out at the door, and there is no improvement on this in the plans shown here, except in what the author gives as "General Fitzwilliam's plan" (plate 56), a cavalry stable plan (apparently) with a wide centre aisle and a high arched door about 9 ft. wide at the end of it, the stalls ranging on either side of the central aisle. There is of course a special reason for this very wide door in a cavalry stable, but private stable doors should be 5 ft. wide; they are nearly all shown 4 ft. in this book. The manner in which the door is cornered in the plan on plate 11 is absurd; it could hardly be worse placed. Even a quiet horse would have to be carefully looked to in being led past the angle of the loose-box and then edged round to get clear through the door; and a restive horse might get himself and his groom into great trouble. In regard to ventilation the author seems to believe in some mysterious and occult power in extract-cowls, before which he bows down as before a process of nature, which he describes in words that are not very intelligible to his readers, or perhaps to himself.

The method shown of inlet ventilation in General Fitzwilliam's plan, a small window over each horse, hinged at its lower edge and falling back inwards when opened, is one of the best methods of supplying air to the horses, but the author does not draw any attention to it in the remarks on ventilation. Where, from necessity, stables can have openings at the end only, as in some positions in towns, there should be special means for conveying fresh air to the horses, instead of allowing those in the centre to breathe the air that has been breathed by the others. Horses want pure air in their dwellings nearly as much as human beings; perhaps their health is not quite so dependent on it, but it must be to a great extent, and to our thinking each horse should have his own air-supply, in such a manner as to reach him without draught.

As a small and inexpensive work, Mr. Giraud's book has its use as a summary of the fittings wanted in a stable, and the manner in which they are usually made; but we should not recommend his plans of stables as models by any means, nor can we say more for the elevations.

A Guide to the Exhibition Galleries of the British Museum. With Maps and Plans. Printed by order of the Trustees. 1890.

THIS guide to our great Museum is a real boon. It is small enough to carry in the hand, and contains sufficient information to enable any generally educated visitor to understand the archæological bearing of all the important classes of exhibits. Of course it is not a popular guide for the uneducated; as Mr. Maunde Thompson says in his preface, "It does not lie within the scope of such a work to supply information which it may be supposed has already been acquired in the ordinary course of education. For example, the main facts of Greek and Roman history and mythology are within the knowledge of most, and any deficiency may be readily supplied from the numerous books of reference. But an exception to this principle has been allowed wherever previous acquaintance with a subject cannot fairly be expected."

A plan of the Museum itself is given, with references to the place where each class of antiquities is to be looked for. A most useful addition to the guide is the insertion of maps of the countries from which different classes of antiquities are brought (Mr. Frederic Harrison, we presume, would say they ought all to be taken back there), so that the geographical relations of site can be identified in the mind with the objects found there; which is an important aid to archæological memory. The notes on the Egyptian antiquities are preceded by a short sketch of Egyptian history, and of what is known as to the manners and life of the ancient Egyptians, without which knowledge the collection is only half comprehensible. The guide to the Greek and Roman vase-rooms is prefaced by a general chapter on vases, with small outline drawings showing the typical shapes and nomenclature.

We presume that a re-issue of the guide is intended at periodical intervals, as we observe that there is a chapter of analysis and description of the drawings at present on view in the large Print Room, which of course is only a temporary selection.

The whole is admirably done, the compilers having had the perception where to stop in a work of this kind, and how to sum up a great deal of information in a small space, so as to keep the book to a convenient size. We hope it will be largely used, to the promotion of a more intelligent understanding of the contents of the Museum on the part of the mass of visitors, who are apt to wander somewhat aimlessly through the great collection, enjoying much of it no doubt, but not realising its historical significance.

NEW REREDOS, WICKERSLEY.—On the 4th inst. a new reredos which has been placed in Wickersley Church (St. Albans'), Rotherham, to the memory of the late Mr. Wm. Aldam, of Frickley Hall, was dedicated at a special service. The memorial is Caen and Roche Abbey stone, and is in three divisions. The centre panel represents the call of St. Peter, and the side panels portray the Resurrection and the Ascension. The panels are separated by clustered columns, with moulded caps and bases, while the upper part is filled with tracery in the style of the Perpendicular period, and finished above with an embattled cornice. The work has been carried out under the superintendence of Mr. E. Isle Hubbard, architect, Rotherham.

Correspondence.

To the Editor of THE BUILDER.

BYZANTINE ARCHITECTURE.

SIR,—In the South of England, — Kent, Sussex, Surrey,—a species of concrete construction is very common, and has been in use from the remotest times. Walls of 12 in. thick, or as much thicker as may be required are to be found.

Land flints, pieces of brick, or other hard stuff are bedded in mortar. At intervals, vertical brick courses are introduced, and about 3 ft. apart, horizontal brick courses, — "lacing courses," as they are called. No external facing of brick is used. The wall is, in fact, of concrete, the whole done with the trowel, and layers of stones laid in. A section through a thick wall of this nature is such as Mr. Aitcheson describes.

At the south (the church stands N. and S.) end of St. Patrick's church, Brighton, is a wall constructed in this way that is fully 80 ft. high from the footings to the gable. It is about 3 ft. thick. It has stood perfectly for some thirty years.

Walls of Norman structures were built in this way, but with the flints close together on the outside to form a facing. If the mortar is good these walls are very strong.

At Blatchington, on the Downs just above Brighton, is an Early Norman church. It has been roofless for at least 250 years, and yet the walls, where not overthrown by violence, have stood.

This church is now being roofed once more. New walls, where required, are built with the old flints in the old traditional way, and the old walls carry the new roof with perfect security.

In speaking of Roman concrete, I think there can be no doubt that we should not use the term "poured in." The material was in most cases "laid in." SOMERS CLARKE.

15, *Dean's Yard, Westminster, S.W.*

COMPTON WYNYATES.

SIR,—I am obliged for "N. S. W. East's" letter in your issue of March 28 [p. 253] with reference to my drawings of the above.

The plan, &c., will shortly be published in the "A. A. Sketch Book" when satisfaction will be tendered on this point. Until then I must ask "N. S. W. East" to accept the names given to the elevations as being moderately correct. The chapel is on the right of the court on entering.

HEBER RIMMER.

6, *Abbey-square, Chester.*

VENTILATION.

SIR,—I am much obliged to the writer of the review on p. 274 for pointing out the misprint on p. 137 of my book: 37,553 linear feet was the amount in two hours, and it should either have said, "or 313 feet a minute," or else the words "a minute" should not have appeared.

W. P. BUCHAN.

Glasgow, April 4, 1891.

The Student's Column.

VENTILATION AND WARMING.—XIV.

APPLICATION OF ARTIFICIAL VENTILATION.

IN any application of artificial ventilation one of the first questions to be determined is the centralisation or de-centralisation of either or both of the two distinct portions of the apparatus, the motive power and the heating power. As a general principle centralisation is usually the more economical, both in first cost, working expense, and supervision or attendance, but no hard and fast rule can be laid down which will hold good in all cases. Each particular problem must be dealt with on its own merits and with a consideration of its peculiar attendant circumstances.

With buildings of simple character, that is, as regards their ventilation, such as churches, theatres, and concert-rooms, centralisation will, of course, in the majority of instances, be preferable, but in dealing with large complicated structures, especially if they contain various portions used under varying circumstances, such as are many of our municipal buildings, for example, it is often advisable to subdivide the ventilation scheme into groups, so as to save the cost of running machinery which is not absolutely being used.

To determine in each particular case what is the best principle to adopt, we must work out in detail for each arrangement, which we can conceive feasible, the first cost and working expenses, including cost of attendance, taking care to so plan each arrangement that similar and adequate results will ensue from each. Only in this way can we rightly decide whether it is better to use, say, one large engine instead of a number of smaller ones, one fan or several, and so on through the whole category.

With the heating appliances, in particular, careful consideration must be made of the various solutions of which the problem admits. It is always a question open to debate whether, in any particular case, it is better to warm the fresh air in a central situation, and then allow for the deperdition of heat during its passage, or to convey the heating agent to a closer proximity to the locality of use. As a general rule, it is advisable to warm the fresh air as near as possible to the point of entry to the apartment; but this is not invariably the case. Much depends upon the form of heating agent used, and, conversely, the advisability of one or other form of heating agent will result from the superior facility for centralising or decentralising the heating power.

In any de-centralisation of ventilating apparatus, one point must especially and most carefully be borne in mind; there must be no chance allowed of one portion of the apparatus acting against another. This is a point most frequently neglected in the matter of outlets. It is no uncommon thing to find a number of extractors, especially of the automatic kind, so arranged that it is almost an impossibility for some of them to avoid drawing air down some one or more of the others.

Another important question that has to be determined at an early stage of the design is whether propulsion or extraction is to be the principle adopted. As we have already stated in our last chapter, the question briefly resolves itself into this, extraction is less costly, but more draughty; propulsion more expensive, but more effective, while perfect success can only be rendered certain by a combination of the two methods, at a further increase of expense.

The question, therefore, is entirely one of pounds, shillings, and pence. The best ventilation is the most expensive, but if the public will not pay for the best, they can have a cheaper but less satisfactory result. The adoption, however, of the dual principle of extraction and propulsion does not necessarily mean doubling the cost, although it does imply some increase. Although in their account of the magnificent scheme of ventilation carried out at the Vienna Opera House, M.M. Demimuid and Herscher appear to consider the second or aspirating fan of little use, it can hardly be logically contended that in the dual method one or other of the motive agents is useless. We are familiar in every day life with the spectacle of a man pushing behind a cart to lessen the strain, and assist the horse that is pulling the load up hill. Neither the horse nor the man alone could probably do the work, but the combined efforts effect what would be too much for either. Somewhat in the same manner is utilised the energy of the dual motive agents in a combined scheme of ventilation. Indeed, with an elastic fluid like air it is more easy to combine the force of a pull and a push than in the case of the cart. If, therefore, the dual method is adopted, it is not necessary to make either of the motive agents so powerful as to be able to do all the work singly. In the Vienna Opera House, which, we must remember, was to a large extent an experimental installation, the motive power supplied is undoubtedly in excess of the minimum necessary, and the excess may possibly amount to the whole work done by the aspirating fan. If this is so, the proper method of economising is not to omit either of the motive agents, but to reduce the magnitude of both. Thus the unquestionable advantages of the dual method would be retained and the expense considerably reduced.

The point of intake for the fresh air is a matter of some moment. This should, of course, be selected primarily with a view to the purity of the fresh air, but also with some consideration for the length of duct involved. The nearest point from which the purest air can be obtained should be selected. It is sometimes fancied that the purest air can be obtained from the highest external part of the building; but, in London at any rate, this has proved to be a fallacy, as the upper atmosphere is more heavily laden with smoke and other impurities. Probably, as a general rule, the purest air will

be found at a height between 10 ft. and 15 ft. from the ground.

Arrangements for cleansing or cooling the air may be then considered. Of these we propose to treat in our next chapter.

The planning of the ducts must have very careful deliberation. In the first place they must be so constructed as to minimise the loss of power resulting from friction and changes of direction. Inattention to this may very seriously jeopardise the efficiency of a scheme, while in ventilation, as in all other architectural matters, only a well-conceived and carefully thought out plan will give adequate return for the expenditure. An interesting illustration of the effect produced by the varying obstruction of the ducts in different instances is seen in the report prepared by the late Professor Carnelley for the School Board of Dundee. Amongst other examples, Dr. Carnelley gives the resulting efficiency of three fans of the same make and size driven by gas-engines also of similar make and power. Notwithstanding the equality of the initial motive agents, the volume of air moved per cubic foot of gas consumed varied enormously, the figures being 14,786 cubic feet, 22,992 cubic feet, and 30,727 cubic feet respectively. From these figures it appears that the first apparatus is doing less than half the efficient work of the last, and this is the kind of result that may frequently occur, unless care is taken to prevent it by a well-designed system of ducts.

Another point in connexion with the designing of ducts, which often receives far too little attention, is their equality of resistance. If this is not attained, it will happen that the delivery or the exhaust of air at different points of the same apartment or building will be of unequal volume and velocity, possibly with a resulting draught or else with inadequate ventilation at some points. This is a matter which concerns all schemes of ventilation, whether they are based on natural or artificial motive agency, whether propulsion or extraction be adopted.

It is of very great importance that any fan or other motive agent which extracts or propels through a number of ducts to a number of points in the same apartment or building should extract or propel equally through all the ducts. This can be managed by a proper design of the ducts so as to give the sum of resistances of equal value in each instance.

Provision should be made for the cleansing of ducts. Neglect of this precaution has given the whole subject of ventilation a very low value in the estimation of medical men connected with English hospitals. Dirt naturally accumulates in ducts and undoubtedly vitiates in time to some degree the incoming fresh air. Not only so, but it also impedes the velocity of the current by increasing the friction of the ducts. For both these reasons, the internal surfaces of ducts should be constructed so as to keep clean as far as possible and to be readily cleansed when occasion requires, so that both efficiency and healthiness may be maintained.

We have already noted that as a general rule fresh air should be introduced at the lower part of the room. In Germany the contrary method is frequently adopted, and in some cases is advocated by English workers; but whatever advantages there may be in occasional instances, it is evident that the disadvantages are too palpable and certain for the downward method to be regarded as satisfactory. The argument that carbonic acid, and, therefore, foul air, is heavier than fresh air loses all its force when we remember that the weight of the carbonic acid does not prevent its rapid diffusion, and that foul air is almost invariably, by its warmth, lighter than fresh air.

OBITUARY.

MR. JOHN DANDO SEDDING, F.R.I.B.A.—We announce with very great regret the death of Mr. J. D. Sedding, F.R.I.B.A., which took place at Winsford Vicarage, Somerset, on Tuesday last, the 7th inst., after a few days' illness. Mr. Sedding will be remembered to many of our readers as the author of numerous papers read before professional and art societies—papers which are too numerous to mention; most of them will be found *in extenso* in the volumes of the *Builder*. We have elsewhere briefly spoken of his merits as an architect. Several of his designs and executed buildings have been illustrated in our pages. Among them we may mention the new Church of St. Edward, near Netley (see *Builder*, November 7, 1885); St. Dyfrig's Church, Cardiff (November 21, 1885); Reredos, Plympton St. Mary Church, Devon (September 4, 1886); Church of the Holy Redeemer, Clerkenwell (May 7, 1887); Reredos, Langport Church, Taunton (June 25, 1887); Brynmawr Vicarage (March 10, 1888); Holy Trinity Church, Upper Chelsea (October 6, 1888, October 12, 1889, and January 4, 1890); Church of St. Peter, Ealing (November 16, 1889); Industrial Schools, Knowle, Bristol (June 14, 1890); and Salcombe Church, Devon (December 13, 1890). Mr. Sedding was elected a Fellow of the Royal Institute of British Architects in 1874.

MR. J. H. STRUDWICK.—We have to record the death of Mr. James Hayward Strudwick, the well-known surveyor, which took place on Wednesday, the 1st inst., after an illness of more than two years. One who knew him writes:—"Mr. Strudwick was born in 1819, educated at the London University, and articled to the late Mr. William Hold, of Manchester-square, a well-known architect and surveyor in his day. Subsequently Mr. Strudwick was appointed by the late Sir Charles Barry assistant surveyor to the Houses of Parliament, and eventually to the entire control of the Surveyor's department. From this time a close and lasting friendship sprung up between that eminent architect and his family. On the completion of the Houses of Parliament, Mr. Strudwick commenced practice on his own account in Old Palace-yard. Some few years after Mr. Godfrey Walter Barry, son of the late Sir Charles Barry, joined him as partner, and so remained until his death. Mr. Strudwick throughout his professional career enjoyed a large and varied practice, and acted as surveyor for many of the most important architectural and engineering works of his day. Mr. Strudwick's justice and practical common-sense made him sought after as an arbitrator and expert witness, and for many years he was a well-known figure in the courts of law, and always a favourite amongst those with whom he came in contact. Mr. Strudwick leaves behind him an only son, who became his partner in 1881, and for some time has carried on the practice alone."

MR. DAVID MACKINTOSH.—The death is announced of Mr. David Mackintosh, architect, Oban, who died suddenly on the 2nd inst. a few yards from his residence in Strathaven-terrace, Oban. The deceased was partner at one time of the firm of Ross and Mackintosh, Inverness, but latterly he had carried on business in Oban on his own account. Among other buildings which he designed of late years were the County Buildings in Oban and St. Oran's Church at Connel Ferry.

MR. WILLIAM COATES.—The death recently took place of Mr. William Coates, who, after carrying on business in Bristol as a builder for nearly fifty years, has lately resided at Walton-by Clevedon. He is stated to have helped liberally in the erection of various local Free Methodist Chapels, including those at Redland Grove, Horfield, and Bartonhill.

GENERAL BUILDING NEWS.

ALMSHOUSES, KING'S CLIFFE (NORTHAMPTONSHIRE).—We are informed that a benevolent lady has decided to have erected a block of almshouses for six persons. Each will have sitting-room, with bed-recess and scullery. Local stone will be used both for walls and dressings. The covering will be of Collyweston stone slates. Wood-block floors and glazed brick fireplaces and skirtings will be provided. The block, to be known as "The Cornforth Homes," to be carried out from plans prepared by Mr. J. Boothroyd Corby, architect, Stamford. Mr. S. F. Halliday, of Stamford, is the builder.

THE LEEDS "SAFE DEPOSIT."—The Leeds Safe Deposit Company, Limited, opened the Leeds Safe Deposit on the 26th ult. It is the first establishment of its kind in Yorkshire; but Milner's Safe Company, who are stated to have erected all the "safe deposits" in the country, including the one at Leeds now under notice, are now engaged in constructing one for Huddersfield. The premises have been erected by Messrs. Gould & Stevenson, from plans prepared by Mr. William Bakewell, architect. Descending a flight of steps from the manager's office, the visitor is confronted by a pair of heavy gates which bar the entrance to the vaults, and here, isolated from all walls, resting on its own girders, and literally enclosed within a fireproof cave, stands the ponderous structure known as the safe deposit. It measures 7 ft. 9 in. high, by 30 ft. long, by 23 ft. deep from front to back, and weighs upwards of 200 tons. In construction it consists of a combination of metals consisting of the toughest of wrought iron, intersected throughout with the hardest of undrillable steel, which claims the essential qualities of being absolutely unbreakable and impervious to the drill, or more ingenious devices of the modern burglar. The floor, sides, roof, front, and back are of great thickness, whilst the wide over-lapping joints, which are covered by powerful angle iron and butt bars, are said to render it impregnable. It has been bolted together from the inside, and upwards of 17,000 steel bolts were used in the process. This strong-room is subdivided into four separate sections, the first of which is fitted with 1,034 distinct safes of various sizes, ranging from 4½ in. in height, by 5½ in. in width, and 20 in. in depth, to 14 in. in height, by 11½ in. in width, and 20 in. in depth, the whole being fastened immovably together.

BATHS AND WASH-HOUSES, GREENHEAD.—On the 31st ult. a deputation from the Corporation of Stockton-on-Tees, consisting of Alderman Major Ainsworth and Mr. K. F. Campbell, C.E., Borough Surveyor, accompanied by Bailie Bowman, Mr. A. B. M'Donald, City Engineer; Mr. A. Mackay, Mr. Thomson, baths superintendent; and Mr. Thomas Murdoch, of Murdoch & Cameron, engineers, Glasgow, visited the Corporation baths and wash-houses, Glasgow. The Corporation of Stockton-on-Tees are now erecting new baths and wash-houses on an extensive scale, and the object of the deputation was to inspect the arrangements of the baths and wash-houses of Glasgow. The chief purpose of the inspection was to see some of the work done by Messrs. Murdoch & Cameron, who lately remodelled and reconstructed the Greenhead washing-houses. The party left the City Chambers about 11 am., and drove direct to Cranstonhill Baths, and thence to Gorbals, with both of which establishments the deputation were highly pleased. Afterwards they visited Greenhead Baths, and expressed their great satisfaction with the wash-houses in that establishment, especially with Messrs. Murdoch & Cameron's method for taking away steam from the washing tubs and boiling tubs. The deputation are stated by a Glasgow paper to have been so well pleased with that firm's engineering work as shown in these baths that before leaving Glasgow they placed the contract for the Stockton-on-Tees baths and wash-houses in their hands.

MEMORIAL CHAPEL, EAST KESWICK.—The new Wesleyan Chapel at East Keswick, erected as a memorial to the late Mr. Joseph Laurence, was opened for public worship on Easter Monday. The chapel is in the Decorated Gothic style of architecture. It is 50 ft. long and 29 ft. wide, capable of accommodating 200 persons on the ground floor, and has a gallery at the west end over the entrance lobbies for fifty scholars. The front consists of a central gable, with an octagonal spirelet at the north-west angle rising to a height of 52 ft. The centre doorway terminates in a gable, having windows on either side to light the lobbies, and there is also a four-light traceried window. The inner lobbies give access to the aisles and to the staircase leading to the gallery. The communion-table is in an arched recess at the east end of the chapel, and over it is a circular traceried window filled with stained glass. The school-room at the rear accommodates seventy scholars. The building is of stone, with the walls lined with brick. The internal woodwork that can be seen is of pitch-pine, varnished; the remaining woodwork is of red deal. Special attention, it is said, has been given to the warming and ventilation. The cost of the building has been upwards of 1,500*l*. Mr. George F. Danby, of Leeds, was the architect, and the contractor for the work was Mr. Robert Brelsford, East Keswick.

NEW FREE CHURCH FOR PAISLEY.—On the 28th ult. the memorial-stone of the new Free Church being erected at Greenlaw, Glasgow-road, Paisley, was formally laid by Mrs. William M'Kean. The style of architecture is Gothic, of the Perpendicular type, and the church is being constructed of red sandstone. The extreme length within walls is 74 ft. by 52 ft., having a recess in front over the vestibule, with one at the north end behind the pulpit. Entrance is obtained through a doorway in the centre of the south front, which leads into a vestibule. A gallery extends round three sides of the church, with a recess behind the south gable; and the roof, which has timbered principals, with mouldings, arched ribs, and foliated cages, rises to a height of 55 ft. above the level of the floor. A square tower 120 ft. high, with pinnacles and octagonal spire, will be situated at the south-east corner. At the corresponding corner an octagonal turret is also being erected. In the centre of the south gable is a traceried and cusped window, having eight vertical lights, divided by moulded mullions and transomes with arched heads. The side fronts have gablets, forming eastern and western transepts, with two lancet and rose windows in each. The area of the church has two-light, and the gallery three-light side windows, whilst the chancel or organ recess is lighted by single windows in the side, and a three-light window in the back. To the back of the church, the hall, the vestry, and the session-house have been placed. It is expected that the total cost will be 4,300*l*. Mr. James Donald, Paisley, is the architect.

THE NEW MISSION CHAPEL AT GLYNTARRELL (Saint Illtyd), near Brecon, which was opened this week by the Lord Bishop of St. Davids, is a small edifice of strictly church character. The length is 51 ft., and the width 19 ft. 6 in. The style of architecture is of the simple lancet character, similar to what prevailed in the early part of the thirteenth century. The chapel is built of the fine hard local stone, without any mixture of Bath or soft stone. The nave is lighted by two two-light windows on either side, and a lancet in the west end. The chancel has two lancets on each side and three in the east end. The entrance is on the south side, near the west end. A small vestry is formed by means of a low screen. The nave is fitted with chairs on floors of wood blocks. The altar-table, choir seats, prayer-desk, chancel-screen, and pulpit are all of oak. There is an oak altar-rail on iron standards. The font is placed near the entrance at the west end of the church. There is a sedilia and

piscina in the sacrarium, and a reredos of stone under the centre light of the chancel. The floor of the chancel and of the centre passage of the nave are of tiles from Messrs. Godwin & Son, Lugwardine. The roof is open-timbered, and covered with green slates. Mr. F. R. Kempson, of Llandaff, is the architect.

SCHOOLS, CARDIFF.—On Monday, the 6th inst., the Bishop of Llandaff opened the new schools of St. Mary, Cardiff. The schools, which are situate at the corner of North Church-street, have been erected from the designs of Mr. Fred. J. Veall, architect, Cardiff. They afford accommodation for 146 girls and 144 infants, and are said to be in strict accordance with the requirements of the Education Department. The buildings have been carried out by Mr. John Haines, of Cardiff, at a cost, including cooking kitchen and extra foundations, of about 1,770*l.*

NEW CHURCH, CHADSMOOR, STAFFORDSHIRE.—The foundation stones of St. Chad's Church, Chadsmoor, were recently laid by Lord Hatherton and Mrs. Bumstead. The church is designed to accommodate 300 worshippers, and will cost 2,500*l.* The style will be simple Gothic, of the early English period. Mr. Samuel Loxton, of Walsall, is the architect, and Mr. Robert Barton, of Hednesford, the contractor.

MISSION HALL, PLYMOUTH.—On the 25th ult. the foundation-stone of a new mission hall, in Grenville-road, St. Jude, Plymouth, was laid by Dr. C. A. Hingston. The principal entrance of the new building will occupy the centre of the south front, and will face Grenville-road. The hall will provide accommodation for some 300 persons. Its height will be 12 ft. 6 in. to the springing of the roof, and 18 ft. 6 in. to the ceiling, which will be of varnished wood. The platform will occupy the north end of the hall, and there will be an ante-room adjoining. There will be class-rooms and other adjuncts towards the north. The walls will be faced with limestone, and there will be red brick dressings to windows and doors. The architect is Mr. James Henry Keats, of Plymouth, and the contractors are Messrs. C. H. Tozer & Son, also of Plymouth.

WESLEYAN CHAPEL, HESWALL, CHESHIRE.—On the 30th ult. the corner-stones were laid of a new chapel, which is being erected at Heswall by the Wesleyan denomination. The site of the new building fronts Telegraph-road, and contains 1,800 square yards, leaving space for future extension and school-buildings. The chapel will have seating accommodation for 325 in nave, transepts, and chancel; minister's vestry, &c., being provided at the rear. The building will be faced with local red sandstone. The windows will have traceried heads, filled with tinted cathedral lead-lights. The contract is being carried out by Mr. John Shaw, of Birkenhead, for about 1,300*l.*, from designs furnished by Mr. Thomas W. Cubbon, architect, Birkenhead, who is also superintending the work.

NEW SCHOOL CHAPEL, HEBBURN, DURHAM.—The ceremony of laying the foundation and memorial stones of a new school-chapel for the Wesleyan Methodist community of Hebburn took place on the 25th ult. The site, which is situated in Argyle-street, will admit of a future extension of the buildings about to be erected. The cost of the building, inclusive of the site, will be about 1,000*l.*, and it will accommodate about 250 persons. In addition to the school-chapel, there will be two class-rooms. The buildings are being constructed of red bricks with stone facings. Messrs. T. A. Page & Son, of South Shields, are the architects.

PRESBYTERIAN CHURCH, NEWTOWNBREDA, BELFAST.—The foundation-stones of a new Presbyterian Church at Newtownbreda were laid on the 4th inst. The building occupies a position at the junction of the Ormeau and Knockbreda roads. The style of architecture is of the Early English period. The walls are being built of Scrabo stone, with red cut stone dressings. The plan is cruciform in shape, the internal columns of cut stone, with their moulded caps, from which spring the arcade arches, divide the nave and side aisles. The transept and chancel arches are also of stone. Above the level of the side aisles there will be a row of clear-story windows. In the front there are two entrances, facing the Ormeau-road. There will be an entrance also in the north side from Knockbreda-road. The buildings at the rear comprise a session-room, space for organ bellows and meter; also a ladies' room, heating apparatus, and lavatory. Accommodation will be provided for 500 on the ground-floor of the church, sixty in the gallery, and forty in the choir. The woodwork generally, including the seats, wainscoting, and gallery front, will be of selected pitch-pine, polished. The ceiling will be sheeted with pitch-pine, and the constructional timbers will be exposed to view. Special care, it is stated, has been devoted to the heating, lighting, and ventilating. The works are being carried out by Mr. Robert Corry, builder, Belfast, from the designs and under the superintendence of Mr. Vincent Craig, architect, Belfast.

RESTORATION OF ST. PETER'S CHURCH, DROITWICH.—This church, which has been closed for several months for restoration, was reopened on the 1st inst. The alterations comprise the reroofing of the north and south transepts, chancel, and porch, enlargement of the vestry, new lights to the window of the north transept, and a new window to the porch. The floor has been lowered a foot, and laid with wood blocks under the seats, while the aisles and chancel have been paved with encaustic tiles. New stone steps have also been added to the chancel. The church has been reseated. The wall over the Norman arch has been pierced with triplet arches in character with the main arch. The work has been carried out by Mr. A. Stokes, of Droitwich, from designs by Mr. Lewis Sheppard, of Worcester. The cost of the work has been £900.

ENGLISH PRESBYTERIAN CHURCH, LLANDUDNO.—Referring to our notice of this church last week (p. 276, *ante*), we are asked to mention that the floors have been laid with Lowe's patent pitch-pine wood block flooring.

STAINED GLASS AND DECORATION.

WINDOWS, ST. LAWRENCE'S CHURCH, TIDMARSH.—Three stained glass windows have recently been placed in the west end of St. Lawrence's Church, Tidmarsh, West Reading, in memory of the late Mrs. Morgan, wife of the rector of the parish. The figure subjects represent different scenes in the early life of our Saviour. The centre window shows the child Jesus working in the carpenter's shop, with the Blessed Mother and Joseph in the background; whilst the other windows represent, one, the flight into Egypt, and the other the finding of Christ in the Temple by the Virgin Mother. The work was carried out by Messrs. Childs & Son, of Reading.

MEMORIAL WINDOWS AT CHRIST CHURCH, JARROW.—On the 29th ult. three stained-glass windows were unveiled in the chancel of Christ Church, Jarrow. They have been placed there by Lord Northbourne, in commemoration of his wife, and have been designed by Mr. Kemp, of London. The window at the east end consists of three lights, and is a representation of the Virgin Mary in the centre position, and Mary and Martha respectively to the left and right. The second consists of a group of figures, representing Hannah and Samuel and Sarah and Isaac; and the third, the figures of Anna and Tabitha.

STAINED-GLASS WINDOW AT TAUNTON.—At the ancient parish church of Taunton St. James a stained-glass window has just been added. It consists of three lights. The figures in the window are surmounted with tabernacle work, and underneath are angels bearing scrolls. The window was designed by Mr. Swayne Bourne, of Birmingham, and it was fixed by Mr. H. J. Spiller, of Taunton.

FOREIGN AND COLONIAL.

FRANCE.—The Académie des Beaux-Arts last Saturday elected M. J. P. Laurens to replace Meissonier in the section of painting. At the final "scrutin" he obtained eighteen votes, against seventeen for M. Lefebvre and one for M. Detaille.——MM. Gérôme and Bouguereau are to go shortly to St. Petersburg, where the Russian fraternity of painters are preparing a cordial reception for them.——M. Alphand has been appointed to represent France at the Chicago exhibition.——M. Eugène Meyer, architect, of Paris, has obtained the first premium in the competition for a new school at Lucerne.——M. Paul Dubois, Directeur de l'École des Beaux-Arts, is to go to Rome to inquire, on behalf of the Minister of Public Instruction, into the reforms necessary at the French school at the Villa Medici.——The Jury of the Champs de Mars *Salon* has selected 1,710 pictures for admission; 1,800 was to be the limit.——M. Gagliardini, the landscape painter, has collected an exhibition of his works at the Georges Petit Gallery, which will be open till the 17th. There is also an exhibition of the landscape paintings of M. Gustave Garaud at the Cercle Artistique, Rue Volney, open till the 20th; and at the Cercle de la Libraire there has been opened the first exhibition of the "Société des Artistes Graveurs au Burin."——The Municipal Council has decided on the reconstruction of the Caserne des Celestins near the boulevard St. Germain, according to the plans of M. Jacques Hermant, selected in a competition last year. The work will cost 4,500,000 fr., towards which the Council has voted an instalment of 624,000 fr.——The death is announced of M. Seurat, a clever impressionist artist and member of the Society of "Artistes Indépendants," at the age of thirty-one; also of M. Davrillé des Essarts, architect, Inspecteur des Travaux to the Cour d'Appel of Paris.——M. Yves Guyot, Ministre des Travaux Publics, has gone to open the new railway of the Orleans Company, to connect Châtellerault with Tournon St. Martin (Indre).——The museum at Versailles has received a portrait of M. Rameau painted by Baudran. Rameau was a descendant of the eminent musician of that name, and was Mayor of Versailles in 1870.——A statue of Theodore de Banville, the poet, is to be erected at his native town of Moulins.——The new railway from Troyes to St. Florentin is to be opened shortly.——The Société Académique d'Architecture of Lyons has, according to its annual custom, opened a competition for 1891, between French and Foreign architects. The same society has also set on foot an annual competition for French and foreign architects, with the view of obtaining the best records of all monuments in the Department of the Rhone which are threatened with destruction either from age, neglect, or alterations of public roads and streets. Information with regard to this may be obtained from the secretary of the Société Académique d'Architecture, at the Palais St. Pierre at Lyons.—The Direction des Musées Nationaux is about to provide at the Luxembourg a section of engraving. As the present accommodation is limited, it is expected that a new gallery will be formed for the purpose, on the site of the garden of the palace occupied by the President of the Senate and known as the "petit Luxembourg."——There is to be opened next month at the Champ de Mars an original kind of exhibition, cansisting of specimens of all the "Journeaux de Mode," as well as all kinds of advertisement designs, &c.——It is announced that the workmen engaged in excavations on a property situated at Aubagne, near Marseilles, have discovered the remains of a Roman monument in good preservation, and having some resemblance to the Maison Carrée at Nimes. The fragments of sculpture found lead to the belief that it was a temple to Diana.——M. Vaudremer, President of the Organising Committee of the Salon, has taken steps to provide that architectural designs should be included in the illustrated catalogue of the Salon, which has hitherto only included painting and sculpture.——M. Achille Hermant, architect, has been commissioned by the Minister of Public Instruction to undertake an inquiry into the legal conditions under which the profession of architecture is practised in Italy, whether it is under any restrictions or whether entirely free.——The Société des Architectes de la Seine Inférieure has applied for powers to adopt a series of measures for the sanitary improvement of Rouen.

WITTENBERG.—The old "Schlosskirche" (built 1499), from the historical point of view one of the best-known churches in Germany, on account of the Reformer Luther having nailed the scroll with his proclamation and 95 theses to the church door, is to have a thorough restoration, to be carried out under the direction of Professor F. Adler, of Berlin. The restoration had already been commenced, by order of the deceased Emperor Frederick III., but had not been continued after his death. The present Emperor has now shown interest in the matter, and wishes the restoration to be complete by 1893.

MISCELLANEOUS.

WATER-MOTOR.—We have received from Mr. Pitman, of Withington, Manchester, diagrams of what he calls "the demon water-motor," which in spite of its rather absurd and grandiloquent name, appears to be a simple and useful water-motor for light work. It consists of a circular flat-iron disc, on each side of the rim of which are a series of equally spaced cups or thimbles, their length parallel to the periphery of the wheel, driven by a twin jet fixed over the front or descending side of the wheel, pouring water into the cups. The latter are arranged in alternative positions, those on one side of the rim occupying a position corresponding to the interspaces on the side, so as to assist in securing a steady and uniform motion.

FURNACE BARS.—Messrs. Clarke & Co., of Nottingham, send us a description and illustrations of their perforated and reticulated furnace bars, which, as put together, form a series of vertical tubes under the furnace, narrowing upwards so as to allow a free ingress of air from below while preventing coal from slipping through before it is thoroughly burned. In fact it combines quick draught with a practically close bottom for the coal to rest on, instead of the wide parallel spaces left by ordinary bars.

COLOURED PHOTOGRAPHS.—At a recent sitting of the Académie des Sciences, Paris, one of its members, Professor Lippmann, explained a new physical method of reproducing the colours of the solar spectrum in the photographic way. Lippmann's process is very simple. Any film employed in photography may be used for it, providing that the sensitive substance is permanently present in it. Those emulsions in which this substance is distributed in the form of fine grains cannot be employed for the purpose. Lippmann used in his experiments bromegelatine plates. The chief feature of the process is that there is under the sensitive film a metallic layer—in Lippmann's method a thin layer of quicksilver—which reflects the rays of light. The further development of the photograph is proceeded with in the usual way. The theory of Lippmann's process is described by him as follows:—The light entering through the objective passes without sensible deflection through the sensitive film of the plate, and effects, with the light reflected from the metallic layer, the division of the film into extremely fine waves, each of which has the exact thickness required for producing the corresponding colour. The vibrations of light are consequently fixed and reproduced almost in the same way as the sound waves in the phonograph. Professor Lippmann submitted to the Academy the results of his experiments in various plates and prints, in which the colours were completely fixed, without being subject to change by the action of light or air.—*Times.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised	Premium.	Designs to be delivered.
*Additional Wards, &c. at Dispensary Bury	Board of Management	20*l.* 10*l.* 5*l.*.....	May 1
Water Supply to Town.....	Rugeley Local Board..	50 Guineas.....	do.
*Public Hall and Offices, Earlestown	Newton-in-Mackerfield Commissioners.....	50*l.* 25*l.* and 15*l.*..	May 28
Odd Fellows Hall, Stafford	Committee	15*l.*	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Making-up Carriageways and Paving Footways	Willesden Local Board	O. Claude Robson	April 14
*Pipe Sewers, &c.....	do	do.	do.
*Repairs to Roads	Borough of Croydon ..	*Official*	do.
*Broken Granite and Flints	Corporation of Kingston-on-Thames.....	do.	do.
Fifty Houses, Argoed, Blackwood, Mon.	Sirhowy Valley Land & Cottage Co. Lim.....	W. L. Griffiths.....	do.
Re-building "Three Horse Shoes" Inn, Ramsey, Hunts	E. V. Sewell	Jas. Ruddle	do
Whinstone Macadam (400 tons).....	South Blyth Local Bd.	*Official*	do.
New Building and Works, Manchester ..	L. & N. W. Ry.	do.	April 15
Ten Cottages, Cilfrew, Neath	Cilfrew Tinplate Wks.	.....	do.
Penmaenmawr Road Stone	Winsford Local Board	*Official*.....	do.
Hotel, Palmerstown, near Cadoxton-juxta-Barry	.....	Bruton & Williams ..	do.
Congregational Chapel, Risca, Newport, Mon.....	Rev. Jacob Williams	Alfred Swash	do.
Wrought-iron Tubes, Stand Pipes, &c.....	Leeds Gas Works	Mr. Lupton	do.
Restoration of Church, Llanfihangel, Rhydithon, Radnor	.....	S. W. Williams	do.
Kerbi'g, Flagging, Pitching, &c.	Bollington Local Bd.	*Official*.....	do.
Disinfecting Chamber, &c.	Darlington Hosp. Com.	do.	April 16
New Co-operative Stores, West Haddon..	The Manager	.....	do.
Alteration and Renovation of Chapel, Wombwell, near Barnsley	.....	Thos. Howdill.....	do.
*Dock Gates (Wrought-iron and Steel)	North Eastern Railwy	J. W. Barry	do.
Timber and other Supplies	Sunderland Corp.	*Official*	do.
Road Metal (1,000 tons)	Penarth Local Board..	Jas. Court.....	do.
Repairs of Highways	do.	do.	do.
Several Houses, Roads, and Drains, Bargoed, Cardiff.....	Bargoed Building Co. Lim.....	W. L. Griffiths	do.
School Buildings, St. Mellion, Cornwall..	F. G. May	.....	do.
Independent Sunday School, Wheatley, Halifax	.....	Jas. Farrar	do.
*Painting Works.....	M. R. Co.	*Official*	do.
*Steam Roller	Buxton Local Board..	J. Hague	do.
Five Dwelling-houses, Staincliffe, Leeds	.....	Walter Crawshaw	April 17
*Arcade, Swansea	Swansea Arcade Co. Lim.....	J. Buckley Wilson....	April 18
Re-building St. Mary's Church, Briton Ferry	The Vicar	.....	do.
*York and Tar Paving, Kerbing, &c.	Hendon Local Board..	S. S. Grimley	April 20
*Four Miles of Cast-iron Socket Pipes	Coventry Waterworks	T. & C. Hawkesley ..	do.
Alterations and Additions to Fire Brigade Station, &c.	Southampton Corp. ..	W. B. G. Bennett	do.
Flint Road Metal	Guildford U.S.A.	Henry Peak	do.
*Supply and Fixing High Pressure Boilers	Paddington P. B. & W. Commrs.....	*Official*	do.
*Paving Works	Camberwell Vestry ..	do.	do.
*Ballast, Sand and Cement	Paddington Vestry ..	do.	do.
*Wood Blocks for Paving	do.	do.	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*York Stone and Masons' Work	Bermondsey Vestry ..	*Official*	April 20
Convent National School, Arklow.....	The Manager	.....	do.
*Removing Mound, &c. Portsmouth	War Department	*Official*	April 21
*Kerbing, Tarpaving, Metalling, and Chanelling Work.....	Lewisham Bd. of Wks	do.	do.
*Pulling-down Buildings.....	Holborn Union	H. Saxon Snell	do.
Four Purifiers	Ossett (Leeds) Gas Co.	*Official*	April 22
*Compensation Reservoir	Nelson Corporation ..	J. Newton & Son	do.
*Cast-iron Lamp Posts.....	Hackney Bd. of Works	J. Lovegrove	do.
*Re-construction of Drainage and Sanitary Fittings	Kensington Guardians	J. W. Aldwinckle	April 23
Alterations and Additions to St. Peter's Church, and Enlarging Schools and Caretaker's House, Cardiff	Rev. D. D. Jones	E. M. Bruce-Vaughan	do.
*Pavilion at Swansea.....	National Eisteddfod of Wales	E. Bath	April 24
Extension of the "Rest," Porthcawl, Glam.	The Committee	G. F. Lambert.....	April 25
Farm Buildings and Cottages, Lancast, Barton, Launceston	Thos. Ffrench	W. T. Martyn Mear ..	do.
Pavilion	Rhyl Peir and Pav. Co.	Darbyshire & Smith..	April 26
*Public Baths and Washhouses.....	St. Giles (Camberwell) Vestry	Spalding & Cross	April 27
*Broken Granite.....	City of London Union	*Official*	do.
*Carriage and Footways, Drainage, and other Works	London CountyCouncil	do.	April 28
*Sewers, &c. Works	West Ham Council ..	Lewis Angell	do.
*Pumping Machinery, Engine and Boiler Houses, &c.	Brighton Council	*Official*	do.
*Enlargement of P. O. at Liverpool.....	Com. of H.M. Wks, &c.	do.	do.
*General Works, Extending Goods' Warehouse and Offices.....	N. E. Ry. Co.	W. Bell	April 29
*Boiler, Engine, Pumps, &c. for Waterwks	West Cowes Local Bd.	W. Brown.....	May 2
*Engine and Boiler House, &c. (Waterwrks)	do.	do.	do.
*Storage Reservoir	Taunton Corporation Waterworks	*Official*	May 4
Doorways, Iron Staircases.....	Knutsford Guardians	do.	No date
New Chancel, Vestries, St. Michael's Church, Runcorn.....	.....	Thos. D. Barry.....	do.
Additions to Glan-mor, Souther-down, Cardiff.....	Mrs. Thomas	Veall & Sant.....	do.
Malting, Newcastle-on-Tyne.....	Addison, Potter, & Sons	Thompson & Dunn....	do.
*Morley House Convalescent Home—New Wing and Offices	.....	G. D. Stevenson.....	do.
New Church, Brechia, near Carmarthen..	.....	E. H. Lingen Barker..	do
House, Huntly-grove, Peterboro'	M. Hall	.....	do.
Alteration and Enlargement of Moorfield House, Headingly, Leeds'.....	J. C. Nicholson	Thos. Ambler	do.
Wesleyan Schools, Cinderford	.....	John Wills	do.
Alterations and Additions to Parsonage House, Ludlow.....	Rev. A. Bannister....	.....	do.
Medical Hall, Builth	Mr. Thomas	.....	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary	Applications to be in
*Sanitary Inspector	Westminster Vestry ..	120*l.*.....	April 16
*Clerk of Works.....	Hornsey Local Board..	3*l.* weekly	April 18
*Assistant Surveyor	Coventry Council	200*l.*.....	April 27
*Clerk to City Surveyor	do.	100*l.*.....	do.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. *Contracts, pp.* iv, vi, *and* viii. *Public Appointments, p.* xviii.

ROBERT BOYLE & SON (LIMITED).—We are informed that the directors of Robert Boyle & Son (Limited), ventilating engineers, London and Glasgow, have resolved to pay an instalment on account of dividend at the rate of 12 per cent. per annum for the half-year ending March 31 last. Messrs. Boyle, we understand, have on hand some very important ventilating contracts in this country and abroad, especially in South Africa, where Mr. Robert Boyle, the managing director, is at present. The air-pump ventilator is being adopted for the ventilation of, amongst other buildings, the House of Parliament, the Castle, Town-hall, New Somerset Hospital, and New barracks, Cape Town; the New Municipal Buildings, Town-hall, Club-house, and Hospital, Kimberley; Stock Exchange, Pavilion, and Club-house, Johannesburg; new House of Parliament, Bloemfontein; new Municipal Buildings and Town-hall, Durban; and St. Andrew College and The Asylum, Algoa Bay.

"A BOOK OF HOUSES."—Mr. Ernest Newton, referring to our recent notice of his "Book of Houses," writes to say that the apparent smallness of the rooms in some of them which we pointed out, is owing to the incorrectness of the scales through an oversight in making the reductions. He has now arranged that the correct scales shall be given in all future copies, and any purchaser may have the corrections sent to him on application to his publisher, Mr. Batsford.

THE ENGLISH IRON TRADE.—The English iron market is still very quiet, and its tone rather weak; in fact, the depression and weakness are greater than when we reported last week. There is no speculative buying whatever, the only sales effected being for immediate requirements, and of the smallest possible quantities. The belief is gaining ground that the bottom has not yet been reached, and that we may witness a similar state of things as existed in 1887. The unfavourable nature of the Board of Trade Returns for March, showing a formidable deficiency in our foreign trade, also does not tend towards restoring confidence. The condition of the pig-iron market is flat in the extreme, and has not been improved by the issue of the Cleveland ironmasters' returns, which, to say the least, are disappointing, and may have had something to do with depressing Middlesbrough pig 1s. a ton. On the other hand, the stores of pig-iron in Scotland continue to be drawn upon, and although some descriptions of Scotch makers' iron are 6d. cheaper, most of the leading brands are scarce, and the least revival in the demand would send them up again. In the hematite trade, also, it is thought that prices will be lower than they are; at any rate, some makers are asking 1s. less. The finished iron trade continues quiet, but there are a few more inquiries here and there, which, however, does not prevent prices becoming weaker. Common bars are 2s. 6d. lower. The general state of the steel market is not encouraging, and quotations are easier. Most descriptions of steel have gone back in value 2s. 6d. a ton. Shipbuilders are quiet as regards new business, but doing a fair amount of work. Engineers also are fairly well employed, while new work is falling off. —*Iron.*

SUTTON-IN-ASHFIELD WATERWORKS.—Mr. George Jennings, of Stangate, Lambeth, has received an order for fixing the electro-mechanical apparatus for indicating and recording in the pumping-station the level of the water in the reservoir, for the Sutton-in-Ashfield Local Board. Mr. George Hodson, F.G.S., of Loughborough, is the engineer. This apparatus was described and illustrated in the *Builder* for September 17, 1887.

MEETINGS.

SATURDAY, APRIL 11.

Architectural Association.—Visit to the Church of St. John the Baptist, Holland-road, Kensington. 3 p.m.

Royal Institution.—Professor Silvanus P. Thompson on "The Dynamo." I. 3 p.m.

MONDAY, APRIL 13.

Society of Arts (Cantor Lectures).—Mr. Hugh Stannus on "The Decorative Treatment of Natural Foliage." I. 8 p.m.

Leeds and Yorkshire Architectural Society. — Mr. F. Tiffany on "Mahogany and other Fancy Woods used for Constructive and Decorative Purposes." 7.30 p.m.

TUESDAY, APRIL 14.

Institution of Civil Engineers.—Discussion on Mr. R. E. B. Crompton's paper on "The Cost of the Generation and Distribution of Electrical Energy." 8 p.m.

Society of Arts (Applied Art Section).—Mr. G. T. Robinson, F.S.A., on "Decorative Plaster Work: Stucco Work." 8 p.m.

WEDNESDAY, APRIL 15.

Civil and Mechanical Engineers' Society.—Mr. J. C. Butterfield on "Explosives, with Experiments." 7 p.m.

British Archæological Association.—Mr. W. T. Brossington, on "The Ancient Library of Gloucester Cathedral." 8 p.m.

Society of Arts.—Mr. W. Topley, on "The Sources of Petroleum and Natural Gas." 8 p.m.

THURSDAY, APRIL 16.

Society for the Encouragement of the Fine Arts.—Second *Conversazione.*

Institution of Civil Engineers.—Students' visit to the works of the Great Northern Railway, between King's-cross and Holloway.

Institution of Electrical Engineers.—8 p.m.

Society of Antiquaries.—8.30 p.m.

FRIDAY, APRIL 17.

Royal Institution.—Professor A. W. Rücker, on "Magnetic Rocks." 9 p.m.

SATURDAY, APRIL 18.

Royal Institution.—Professor Silvanus P. Thompson on "The Dynamo." II. 3 p.m.

Edinburgh Architectural Association. — Visit to Fountainhall, Pencaitland Church, and Winton Castle.

Glasgow Architectural Association.—Visit to Largs.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

4,662.—BEVELLING SQUARE: *J. P. Bayley.*—This invention relates to an instrument enabling angular measurements to be made at both sides and both ends of the square. A longitudinally-slotted plate has attached at each end a square consisting of two arms at right angles—one bevelled, the other provided with a threaded stem or stud adjustable in the slot of plate by thumb nuts, the same by which the squares are clamped to the slotted plate.

6,147.—GLAZING: *A. Montrose.*—According to this invention, a T-shaped astragal is used, with corrugated metal supports, and a single piece or two strips of lead or soft metal serves as a cap for the sheets of glass.

6,265.—DOOR CLOSER: *C. J. Orr.*—The patentee employs a weight for closing the doors, and this weight is arranged, by suitable mechanism, to act in a very similar way to the hydraulic or pneumatic closers.

16,786.—PAINTS: *W. A. Hall.*—The paints which are the subject of this patent are dry or water paints, the dry ones being composed of silicates and chemicals mixed in suitable proportions, and adapted to be applied as a surface covering in a liquid state after the manner of paint by the addition of water. A second form is also produced in the form of a powder, but is used with hot water; while a third is in a liquid form, combining the chemicals and colouring pigments held in solution.

17,668.—SASH PULLEYS: *J Clarkson.*—Instead of the ordinary rectangular face to which the pulley is attached, and which requires to be mortised into the pulley-stile by the chisel, the face is according to this invention formed in such a manner that it is sunk in the desired position by a single rotary cutting-tool, thereby saving time and labour.

20,862.—SLIDING-DOORS, &C.: *J. Newall and another.*—The apparatus which is the subject of this patent consists of an oblong box, one end projecting a quarter of an inch over each side, with a space in the centre to admit a solid revolving roller working on an axle shaped as a three-sided oblong. This axle is supported by a strong coil spring, the spring at one end being rivetted to the bottom of the box. The axle works between two pivots on each side of the box. These act as two slides to keep the axle and roller in its proper position.

NEW APPLICATIONS FOR PATENTS.

March 23.—5,137, G. Bray, Ventilation.—5,149, J. Bingall, Champer Plane.—5,157, H. Marten, Stands for Paper-hangings, Pattern-books.—5,166, S. Pitt, Raising and Lowering Sliding Frames, &c.

March 24.—5,193.—D. Noble, Washing or Cleansing Walls, Ceilings, &c.—5,195, A. Page and G. Way, Prevention of Down-draught in Chimneys.—5,200, W. Burr, Stop-cock twin Water-waste Preventing Cistern.—5,203

W. Hughes, Sash-spring Coil and Axle Pulley.—5,224, L. Sagendorph, Metallic Facing for Buildings.—5,227, A. Green, Opening or Shutting Skylights, Windows, &c.—5,265, A. Prentice, Window Sashes and Frames, &c.—5,267, S. Miller & Others, Flush-tanks.—5,273, J. Minier, Closing or Retaining Doors, &c.

March 25.—5,309, H. Bruck, Imitation Marble.—5,331, G. Goldsmith, Chimney Cowls.

March 26.—5,363, D. Nicoll, Slabs for Road-making.—5,365, R. Jesson and others, Brick Moulds, &c.—5,372, B. Phillipson, Water-closet.—5,389, J. Shone, Ventilation of Drains and Sewers.—5,392, F. Marwood, Window Fastener.—5,423, T. Smith, Sash Fastener.—5,424, J. Pulham, Construction of Fireproof Staircases, Floors, &c.

March 28.—5,463, J. Kulage, Brick-making Machines.—5,483, H. Nemity, Mural and other Decorations.—5,497, W. Horn, Wall and Ceiling Polish.

PROVISIONAL SPECIFICATIONS ACCEPTED.

2,554, W. Ingram, Spirit Levels.—2,749, J. Young, Tiles, &c.—2,922, R. Crane, Floor-warming Radiators or Coils.—2,595, W. Holbrook, Draught-preventer for Doors and Casements.—3,884, W. Bendall, Paint Cans or Pots.—4,408, S. Chitty and B. Williams, Stay or Fastener for Casements, &c.—4,484, J. Townshend, Folding or Collapsible Seats.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

5,403, J. Smeaton, Flushing and Waste-preventing Apparatus for Water-closets, &c.—6,805, W. Thompson, Paints, &c.—8,412, G. Strawson, sen., and G. Strawson, jun., Attaching Glass to Greenhouses, &c.—8,413, J. Hartnell, Artificial Stone.—18,818, A. Steele, Stoves or Fire-grates.—3,369, W. Moore, Water-closets.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

APRIL 2.—By *Newbon & Co*: 7, Sheep-lane, Hackney, u.t. 80 yrs., g r. 4*l.* 5s., r. 32*l.* 10s., 185*l.*; 58, Wellington-rd., Barnsbury, u.t. 52 yrs., g.r. 6*l.*, r. 30*l.*, 157*l.*; 35, Ovington-st., Chelsea, u.t. 40 yrs., g.r. 12*l.*, r. 46*l.*, 610*l.*; 4 and 6, College-pl., u.t. 17½ yrs., g.r. 6*l.* 6s., r. 62*l.* 8s., 360*l.*; 8, Westbourne-st., u.t. 30 yrs., g.r. 6*l.*, r. 45*l.*, 460*l.*; 11, 13, and 15, Hale-st., Islington, u.t. 36 yrs., g.r. 15*l.* 15s., r. 98*l.*, 885*l.*; 6, Myddelton-sq., Pentonville, u.t. 21 yrs., g.r. 5*l.* 1s. 4d., r. 60*l.*, 415*l.*

APRIL 3.—By *D. J. Chattell*: A plot of land, Eastcote-street, Stockwell, u.t. 76 yrs., at a peppercorn, 550*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	6/10/0	7/15/0
Teak, E.I... load	8/10/0	14/0/0
Sequoia, U.S.ft.cu.	2/3	3/0
Ash, Canada load	2/10/0	4/5/0
Birch, do.	2/5/0	4/5/0
Elm, do.	3/10/0	4/15/0
Fir, Dantsic, &c.	2/0/0	3/15/0
Oak, do.	2/10/0	4/10/0
Canada.....	4/17/6	6/10/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/0/0	5/10/0
Lath, D'ntsic, fath	5/0/0	6/0/0
St. Petersburg	5/0/0	7/0/0
Deals, Finland, 2nd & 1st std 100	7/0/0	10/0/0
Do, 4th & 3rd..	7/0/0	8/0/0
Do. Riga	6/0/0	7/10/0
St. Petersburg, 1st yellow ..	9/10/0	14/0/0
Do. 2nd yellow	8/0/0	9/0/0
Do. white	6/10/0	10/0/0
Swedish	6/10/0	15/0/0
White Sea	8/0/0	16/10/0
Canada, Pine 1st	13/0/0	24/0/0
Do. do. 2nd....	9/0/0	15/10/0
Do. do. 3rd, &c.	6/10/0	10/0/0
Do. Spruce. 1st	8/10/0	10/10/0
Do. do. 3rd & 2nd.....	6/0/0	7/10/0
New Brunswick	5/0/0	7/0/0
Battens, all kinds	3/10/0	15/10/0
Flooring Boards, sq., 1 in. prep. 1st	0/10/0	0/14/0
Do. 2nd.....	0/9/0	0/10/6
Other qualities	0/5/0	0/7/6
Cedar, Cuba ..ft.	/4	/4½
Honduras, &c.	/4	/4½
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4½	/6½
Mexican do. do	/4½	/5½
Tobasco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	10/0/0	20/0/0
Bahia	9/0/0	18/0/0

TIMBER (*continued*).		
Satin, St. Domingo .....ft.	0/0/10	0/1/3
Porto Rico	0/0/9	0/1/6
Walnut, Italian..	0/0/3½	0/0/7
METALS.		
IRON—Bar, Welsh, in London..ton	6/5/0	6/15/0
Do. do. at works in Wales	5/15/0	6/5/0
Do. Staffordshire, in London	6/5/0	7/0/0
COPPER—British, cake and ingot	56/0/0	57/0/0
Best selected ..	59/0/0	60/0/0
Sheets, strong..	66/0/0	0/0/0
Chili, bars	52/10/0	0/0/0
YELLOW METAL lb.	0/0/6	0/0/6½
LEAD—Pig, Spanish....ton	12/12/6	0/0/0
English, com. brands	12/12/6	12/15/0
Sheet, English, 3 lbs. per sq. ft. and upwards ..	14/10/0	0/0/0
Pipe	14/10/0	0/0/0
ZINC—English sheet .....ton	26/10/0	0/0/0
Vieille Montagne.....	27/0/0	0/0/0
TIN—Straits	90/10/0	0/0/0
Australian	90/15/0	0/0/0
English Ingots	94/10/0	0/0/0
OILS.		
Linseed .....ton	22/5/0	0/0/0
Cocoanut, Cochin	36/0/0	0/0/0
Do. Ceylon	30/0/0	0/0/0
Palm, Lagos	26/10/0	0/0/0
Rapeseed, English pale	30/0/0	30/5/0
Do. brown	28/10/0	0/0/0
Cottonseed ref...	21/10/0	0/0/0
Oleine	21/15/0	24/0/0
Lubricating, U.S.	6/0/0	7/0/0
Do. refined	7/10/0	12/0/0
TAR—Stockholm barrel	1/1/6	1/2/0
Archangel	0/13/6	0/0/0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

AUDENSHAW.—For sewering, levelling, paving, kerbing, and flagging Chapel-street, Garden-street, Cartwright-street, and Kilshaw-lane, Hooley-hill, for the Audenshaw Local Board. Mr. J. H. Burton, Surveyor, Ashton-under-Lyne:—
Underwood & Bro. Dukinfield (accepted at per schedule of prices).
[Seven tenders were received.]

BEDFORD.—For new class-rooms to the Bunyan Meeting, Bedford. Messrs. Usher & Anthony, architects, St. Paul's-square, Bedford:—

Geo. Harrison	1,328	Melcombe Bros.	£1,247
S. Foster	1,266	T. H. Coleman	1,208
W. Haynes	1,254	J. P. White	1,189

[All of Bedford.]

BOLTON.—For new Salvation Army Citadel, Bolton. Mr. W. Gillbee Scott, architect, 25, Bedford-row, London, W.C.:—

A. Martin	£5,588 0 0	W. Bryce	£4,400 0 0
French & Ellwood	4,950 0 0	Wm. A. Peters & Sons	4,250 0 0
T. Hipwell	4,650 0 0	A. & T. Main, Loughborough (accepted)	4,225 0 0
Wm. Townson	4,461 10 0		
Jas. Byrom	4,446 0 0		

BRADWELL.—For alterations and additions to Wesleyan Chapel, Bradwell, Derbyshire. Mr. Herbert W. Lockwood, architect, Queen Insurance Buildings, Church-street, Sheffield. Quantities by the architect:—

Thomas Roper	£1,065 0 0	E. & W. Oxley	£820 0
John Robertson	1,027 0	Hill & Lomas	778 10
C. H. Gillam	1,009 0	Hill & Brother, Tideswell*	775 0

* Accepted.

BRENTFORD.—For erecting new warehouse, stabling, &c., High-street, Brentford, for Mr. James Bradbury. Mr. S. Woodbridge, jun., architect, Brentford. Quantities supplied:—

B. E. Blasby	£2,062	J. Messom	£1,910
T. Hiscock	2,055	T. Gregory & Co.	1,877
H. & E. Lee	2,039	J. Dorey & Co., Brentford*	1,821
Lansdown & Co.	1,998		

* Accepted.

BUCKLAND (near Dover).—For the erection of shop and residence, Buckland, Dover. Messrs. Cresswell & Newman, architects and engineers, 54, Castle-street, Dover:—

H. Stiff	£945 0	W. G. Lewis	£835 16
Austen & Lewis	840 0	W. T. Dowle (accepted)	789 0

CARDIFF.—For the erection of a school, caretaker's house, kitchen, &c., Saltmead, for the School Board. Mr. J. P. Jones, architect, 27, Park-street, Cardiff. Quantities by the architect:—

Osborne & Co.	£14,646 0 0	W. Symonds	£11,970 10 0
J. Allan	13,176 0 0	Shedher'd & Son ..	11,948 0 0
Thos. Gough	13,019 16 2	J. Haines	11,752 10 6
D. J. Davies	12,700 0 0	Chas. Dunn	11,750 0 0
Henry Davies	12,571 12 2	Turner & Sons, Cardiff*	11,702 0 0
Burton & Co.	12,193 12 10		
David Davies	11,993 0 0		

* Accepted.

CHELMSFORD.—For additions to a flour-mill. Mr. A. E. Christy, architect, 30, Great St. Helen's, E.C.:—

	Addition in Timber.	Addition in Brick.	Boiler House and Chimney-shaft.
Neil	1,415	1,452	395
Leech	1,340	1,340	450
Higgs	1,305	1,285	440
West	1,290	—	—
Brown	1,235	—	—
Dupont	1,180	1,180	320
Gozzett	1,150	1,100	—
Johnson*	985	1,035	298

* Accepted subject to modifications.

CLACTON-ON-SEA.—For building and completing proposed alterations and new shop premises in the North Avenue, Clacton-on-Sea, Essex. Mr. A. W. Huxter, surveyor:—

W. G. Gillingham	£1,487	J. C. Allen	£1,392
W. Sargeant	1,425	M. Potts (accepted)	1,225
Ellis & Turner	1,410		

DEVIZES.—For erecting new premises for the Wilts & Dorset Bank, Devizes. Mr. G. M. Silley, architect:—

Geo. Humphreys	£3,991	Crook & Son	£3,537
H. Flewelling	3,873	R. B. Mullings (accepted)	3,363
Stephens, Bastow, & Co. ..	3,799	G. Brown	2,500

EASINGWOLD.—For cast-iron water-mains, valves, hydrants, and service pipes, for the Union Guardians. Messrs. Fairbank & Son, engineers, Driffield, Yorkshire:—
Thomas Bell, Market Weighton, Yorkshire £1,540 16 8

GREAT WYRLEY (Staffs.).—For additions to school, for the Cheslyn Hay and Great Wyrley School Board. Mr. John Greensill, architect, Great Wyrley, Staffordshire. Quantities by Mr. John Greensill:—

A. Williams	£346 16 10	J. Hunter	£320 10 0
R. Barton	335 0 0	S. Wootton, Bloxwich*	288 19 0

* Accepted.

HOUGHTON-LE-SPRING.—For the construction of the main drainage and sewage disposal works for the town, for the Local Board. Mr. D. Balfour, engineer, 3, St. Nicholas-buildings, Newcastle-on-Tyne:—

J. Goldsbrough	£4,498 10 0	G. Robson	£3,821 11 10
J. T. Simpson	4,300 10 10	T. Dixon	3,716 0 0
Nicholson & Elliot ..	3,941 17 0	J. Carrick, Durham*	3,642 0 0
R. Hudson, jun.	3,897 0 0		

* Accepted.
[Engineer's estimate, 3,630*l.*]

ISLEWORTH.—Accepted for alterations and additions to four cottages, Linkfield-lane, for the Royal Brewery Company, Limited, Brentford. Mr. S. Woodbridge, jun., architect, Brentford:—
W. Foord & Son.... £129 0 0
[No competition.]

KING'S CLIFFE.—For the erection of almshouses,—"The Cornforth Homes,"—at King's Cliffe, Northamptonshire. Mr. J. Boothroyd Corby, architect, Stamford:—

Jno. Woolston	£1,630	R. Scholes	£1,499
W. Dean	1,620	Thos. Woolston	1,488
E. Bowman	1,590	Perkins Bros.	1,427
Thoday & Son	1,577	W. Hilliam	1,421
A. S. Roberts	1,545	S. F. Hallilday, Stamford*	1,367
Roberts Bros.	1,541		

* Accepted.

LANCHESTER (Co. Durham).—For the execution of sewerage works, at South Moor, for the Union Rural Sanitary Authority. Mr. J. E. Parker, Engineer, Union Offices, Lanchester:—

Thos. Forster & Son ..	£836 16 9	Kelland Groves, Chester-le-Street*	£745 0 0
Jos. Goldsbrough	791 4 8		
Thos. Thompson & Son	780 7 0		

* Accepted.

LEWISHAM.—For new farm buildings and repairs to Slagrave Farm, Ladywell, S.E., for Mr. Henry T. Wood. Mr. Edgar H. Selby, architect, 26, Craven-street, Strand, W.C.:—
H. T. Hoare, Lewisham (accepted) £243 7 0

LISCARD (Birkenhead).—For the erection of ornamental entrance-gates, fencing, conveniences, &c., New Park, Liscard Hall, for the Wallasey Local Board. Mr. A. Salmon, Surveyor, Public Offices, Egremont, Cheshire:—

J. W. Wilson	£1,542	T. Catterall & Co.	£1,525
E. Worrall & Co.	1,509	A. Bleakley	1,688
D. Hughes	1,457	Jas. Downham	1,537
Chas. Smith & Sons	1,780	R. T. Smith & Co., Whitchurch (accepted)	1,487
W. H. Peake & Sons	1,671		

LONDON.—For the erection of Holy Trinity Parish-hall, recreation-rooms, soup-kitchen, residence, &c., at Canning Town, E., for the Rev. J. Russell, B.A., and the Building Committee. Messrs. J. T. Newman & Jacques, architects, 2, Fen-court, E.C. Quantities by Messrs. R. L. Curtis & Son:—

Sharpe	£3,121	Morter	£2,987
Hearle	3,107	Reed	2,938
Catley	3,083	Hosking	2,959

Constructional Ironwork.

Whitford & Co.	£458	Walter Jones	£346

LONDON.—For alterations, &c., to the "Bell," Leicester-street, Leicester-square, W., for Mr. R. A. Morgan. Mr. H. I. Newton, architect, 49, Victoria-street, Westminster, S.W.:—

Grover, Treharne, & Co. ..	£2,394	F. Mark	£2,225
Spencer & Co.	2,390	Patman & Fotheringham..	2,090
S. Godden	2,318	C. Dearing & Son	2,013
J. Anley	2,300	Edwards & Medway*	2,006

* Accepted.

LONDON.—For alterations, &c., to the "Durham Arms," public-house, Hackney-road, E., for Mr. Alfred Lamb. Mr. Joseph G. Needham, architect, 11, Pewerscroft-road, Clapton:—

W. Higgs	£3,065	Mower & Son	£2,847
Coulsell Bros.	3,025	J. & F. Bane*	2,475
Walker Bros.	2,980		

* Accepted.

Gasfittings.

Christie	£222	M. Christian	£166
F. Flamhead	200	J. Dix*	164
J. Steadman	167		

* Accepted.

Pewtering.

T. Heath	£129	W. Pringle	£109
J. Edwards	126	W. Paddon*	97

* Accepted.

LONDON.—For alterations to the "Frying Pan" public-house, Brick-lane, E., for Messrs. Truman, Hanbury, & Co. Mr. S. W. Grant, architect:—

Atherton & Latta	£1,780	Bovis & Co.	£1,385
Holloway Bros.	1,470	Whitehead & Co.	1,225
W. Shurmur	1,455	J. Smith & Son	1,185

LONDON.—For the erection of the "Eclipse Glass Works," Lea Bridge. Mr. W. G. Shoebridge, architect:—

F. & F. H. Higgs	£1,680	W. Shurmur	£1,548
T. Boyce	1,623	Walker Bros.	1,542
Grover & Son	1,599	Turtle & Appleton	1,518
Goodall	1,558	J. Parker	1,510
J. Chessum & Son	1,549	J. H. Mollett	1,415

LONDON.—For new hall at the Upper Clapton Congregational Church. Mr. W. D. Church, architect:—

W. Dabbs	£2,842	W. Shurmur	£2,772
Woodward & Co.	2,820	F. J. Coxhead	2,389
Holloway Bros.	2,799	J. Chessum & Son	2,087

LONDON.—For rebuilding the "Roebuck" public-house, Great Dover-street, for Messrs. Truman, Hanbury, & Co. Mr. B. J. Capell, architect:—

F. & F. J. Wood	£6,064	Whitehead & Co.	£5,432
Staines & Son	5,907	E. Todd	5,354
W. Shurmur	5,515	Harris & Wardrop	5,333

LONDON.—For foundations, &c., at Hancock-road, Bromley-by-Bow. Mr. H. Poston, architect:—

Holliday & Greenwood	£456	J. Morter	£429
Wm. Shurmur	432		

LONDON.—For alterations and additions at the "Bird-in-Hand" public-house, Bow. Mr. Edward Brown, architect, 1, Princes-street, Spitalfields, E.:—

S. Hayworth & Sons	£993	S. W. Hawkings	£793
S. Goodall	963	W. Higgs	735
J. T. Robey	847		

LONDON.—For interior decoration, No. 93, Gloucester-terrace, Paddington. Mr. R. A. Briggs, architect & surveyor:—

Langridge & Sons	£175	H. R. Anderson	£145
Blaster	160		

LONDON.—For alterations and additions to premises, Rotheasy-street, Bermondsey, S.E., for Mr. J. Armfield. Mr. E. Crosse, architect:—

A. W. Neal	£442 18	A. White & Co.	£389 0
A. & W. Garner	433 5	T. W. Knight	365 0
A. G. Battley	409 0	Chalkley	363 0

LONDON.—For the erection of proposed mission-hall and caretaker's house, at Tait-street, Shadwell, E., for the Rev. C. H. Turner. Mr. A. Ashbridge, architect:—

Harris & Wardrop	£1,019	Balaam	£866
Hearle & Son	898	A. White & Co.	821
Cleaver	890	M. Calnan	803
Wilson	875		

LONDON.—For paving yards, van-sheds, stables, and factory floors with 1½ in., 2 in., and 3 in. Patent Pengarvon, Victoria, or Imperial Stone, laid *in situ*, at the Far-Famed Cake Co.'s new premises, Rifle-street, Bromley, E. Messrs. S. & F. Clarkson, architects:—
Lewis Griffiths & Co., Millwall, E. (accepted), for Pengarvon Stone, at 3s. 10d., 4s. 6d., and 5s. 6d. per yard super respectively.

LONDON.—For paving with 2 in. Patent Penzarvon, Victoria, or Imperial Stone, laid *in situ*, forecourts, corridors, playground, &c., at the All Saints' Church Schools, Wandsworth, S.W., for the School Committee:—
Lewis Griffiths & Co., Millwall, E. (accepted), for Pengarvon Stone, at 4s. 6d. per yard super.

LONDON.—For building east block to Victoria Model House (No 2), Whitechapel-road, for Lord Radstock and the Building Committee. Mr. W. Gillbee Scott, architect, 25, Bedford-row, London, W.C.:—
W. Hearn & Co, Craven-terrace, W. (accepted) £3,343 0 0

LONDON.—For fitting up latrines, urinals, &c., at the St. George's Union Workhouse, Fulham-road, S.W., for the Guardians of the Poor of the St. George's Union, Mr. H. Saxon Snell, architect, London:—

Robert P. Beattie	£874	Flew & Co, 2, Bank-buildings, West Kensington*	£699
H. Wall & Co.	749		
John Peattie	745		

* Accepted.

LONDON.—For the erection of a conservatory, for Mr. C. Wells, Clifton Lodge, Thornton-road, Clapham Park:—

Downs Bros.	£279 0 0	Candler	£275 0 0
Potterton	278 0 0	W. Long (accepted)	266 10 4

LONDON.—For alterations and general repairs to 20, Talbot-square, Hyde Park. Mr. Edgar H. Selby, architect, 26, Craven-street, Strand, W.C.:—
F. Cooper, Beckenham (accepted) £420 0 0

LONDON.—For works at the Bible Christian Schools, at Lea. Mr. R. Williams, architect:—

Wells	£657	W. Vanstone	£530
Harrell	568	Powell	420

LONDON.—For painting and repairing the West-square Orphanage, Southwark:—
W. Vanstone (accepted) £160 0 0

MARGATE.—For the erection of sea wall and construction of promenades, at Fort Point, Margate, for the Town Council:—

Robeson & Rickett ..	£1,979 0 0	T. & W. Denne	£1,700 0 0
Cooke & Co.	1850 0 0		

MARGATE.—For the erection of stable premises and a cottage at the Town-yard, Victoria-road, for the Margate Town Council:—

Bushell & Sons	£897 0 0	Barwick & Ansell	£853 0 0
F. J. Doughty	875 0 0	Robeson & Rickett	846 0 0

MARGATE.—For erecting cottage and boundary walls, &c., at the Cemetery, for the Margate Burial Board:—

F. J. Doughty	£565 0 0	Robeson & Rickett	£497 0 0

NEWPORT (Mon.)—For re-building Cumberland House, Courtybella-road, for Messrs. Hancock & Co., Limited. Mr. Jno. P. Jones, architect, 27, Park-street, Cardiff. Quantities by the architect:—

T. Prosser	£1,493	W. Blackburn	£1,150
Shepherd & Son	1,383	D. Davies	1,146
Jones & Son	1,247	W. Price	1,125
J. Linton	1,200		

NORWICH.—For the erection of a residence for the Medical Superintendent at the County Asylum, Thorpe, for the Committee of Visitors. Mr. T. H. B. Heslop, C.E., County Surveyor, Norwich :—

Downing & Son	£2,048 0	S. Hall	£1,845 0
A. J. Harvey	1,905 0	Evans	1,739 0
Scarles Bros.	1,895 0	Smith & Watling, Pitt-street, Norwich*	1,599 5
Horace Lacey	1,893 0		
T. H. Blyth	1,890 0		

* Accepted.

NOTTINGHAM.—For erecting Technical School buildings, and alterations in connection therewith, at the University College, Nottingham. Mr. F. S. Granger and Mr. W. A. Heazell, joint architects, Nottingham. Quantities by Messrs. Berridge & Barnes, Nottingham :—

A. E. Clarke	£13,602 0 0	Bell & Son	£12,290 0 0
C. Baines	13,150 0 0	H. Vickers	12,290 0 0
B. Keeling	12,722 0 0	Thos. Whittaker	12,112 0 0
Fish & Son	12,720 16 6	J. G. Thomas	11,937 0 0
J. J. Adams	12,720 0 0	Pillatt	11,898 0 0
E. Hind	12,597 0 0	Jos. Shaw	11,870 0 0
Cuthbert	12,596 0 0	Gilbert & Gabbatiss	11,782 0 0
J. H. Clark	12,540 0 0	F. Messom	11,767 0 0
W. Woodsend	12,425 0 0	Wheatley & Maule	11,700 0 0
Hodson & Son	12,389 0 0	Evans & Co., Nottingham*	11,647 0 0
Barlow	12,389 0 0		
J. Hutchinson	12,380 0 0		

* Accepted.

NOTTINGHAM.—For alterations and additions to the Basford Union Workhouse, Nottingham, for the Basford Board of Guardians. Mr. Herbert Walker, architect, Nottingham :—

Ingham & Son	£2,104 0	F. Messom	£1,761 0
T. Cuthbert	2,100 0	J. Shaw	1,759 0
J. Sills	2,080 0	Enoch Hind	1,747 0
J. F. Price	2,068 0	J. G. Thomas	1,737 0
Henry Vickers	2,010 0	T. Barlow	1,710 0
Wheatley & Maule	1,860 0	G. Hopewell & Son, Old Basford, Nottingham*	1,690 0
Henry Scott	1,842 10		
A. B. Clarke	1,791 0		

* Accepted.

PAIGNTON.—Accepted for alterations and additions to the "Gerston Hotel." for the trustees of the late Mrs. E. Dendy. Mr. S. Woodbridge, jun., architect, Brentford :—

R. Harris, Paignton £1,048 0 0

[No competition.]

PETERBOROUGH.—For new Salvation Army citadel, Peterborough. Mr. W. Gillbee Scott, architect, 25, Bedford-row, London, W.C. :—

A. & T. Main, Loughborough (accepted) £1,400 0 0

RICHMOND (Surrey).—For alteration and addition at "Axholme," Park-lane. Mr. Edward Maynard, architect. Quantities supplied :—

A. Lillywhite	£524 0	B. E. Braby	£494 10
Soole & Son	496 0	Sweet & Loder*	488 0
A. Hunt	495)		

* Accepted.

RUMNEY.—For additions and alterations to schools, for the School Board. Mr. Jno. P. Jones, architect, 27, Park-street. Cardiff. Quantities by the architect :—

Burton & Co.	£1,290 0 0	G. Griffiths	£1,070 10 0
H. Davies	1,285 0 7	Gibbon & Hodgkinson	1,051 0 0
D. J. Davies	1,200 0 0	A. Elliott	1,042 0 0
T. Gough	1,153 0 0	Shepherd & Son, Cardiff*	1,032 0 0
Castell	1,075 0 0		
D. Davies	1,073 0 0		

* Accepted.

SEVENOAKS.—For alterations and additions to "The Warren," near Sevenoaks, Kent. Mr. H. Percy Monckton, architect, 32, Walbrook :—

Wallis & Sons	£1,920	Wiltshire	£1,868
Pryer & Co.	1,899	R. Avard, Maidstone*	1,674

* Accepted.

STUDLAND BAY (Dorset).—For the construction of two new roads on the Studland Bay Estate. Mr. W. Charles Evans, surveyor :—

Burt & Burt ..... £1,470 | H. & J. Hardy £1,040

TENBY.—For new roof to market, for the Mayor and Corporation. Mr. W. Newton Dunn, architect, 1, Bucklersbury, London :—

J. Thomas	£1,426	D. & J. Davies	£1,080
Nicholls & Beynon	1,246	William Davies	1,017

[All of Tenby.]

WESTGATE-ON-SEA.—For alterations and additions to Granville Lodge, Westgate-on-Sea, for Dr. A. Flint, J.P. :—

W. W. Martin	£453	Robeson & Rickett	£447
J. Shrubsole	448		

WINSLOW (Bucks.)—For new banking premises for the Bucks and Oxon Union Bank, Limited. Messrs. Ayres & Ardron, architects, 8, Southampton-street, Bloomsbury-square, W.C. Quantities supplied :—

Matthews	£3,449 10 9	Webster & Cannon, Aylesbury*	£3,048 0 0
Marshall	3,300 0 0		

* Accepted as reduced, £2,960.

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TO CORRESPONDENTS.

G. H. (Thanks; not desired).—H. R. (The quotation is hardly worse than many other specimens of architectural criticism in the daily press).—L.

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We are compelled to decline pointing out books and giving addresses

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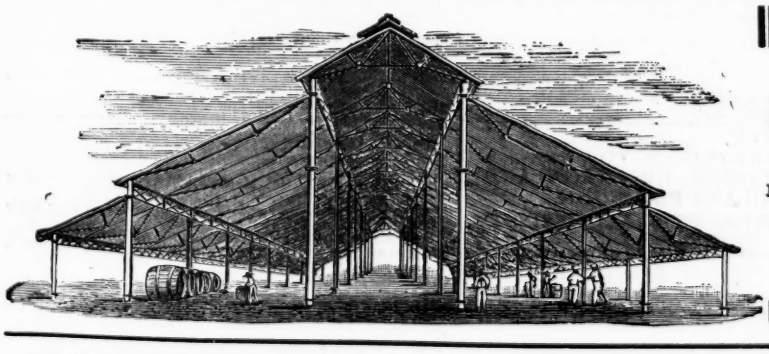

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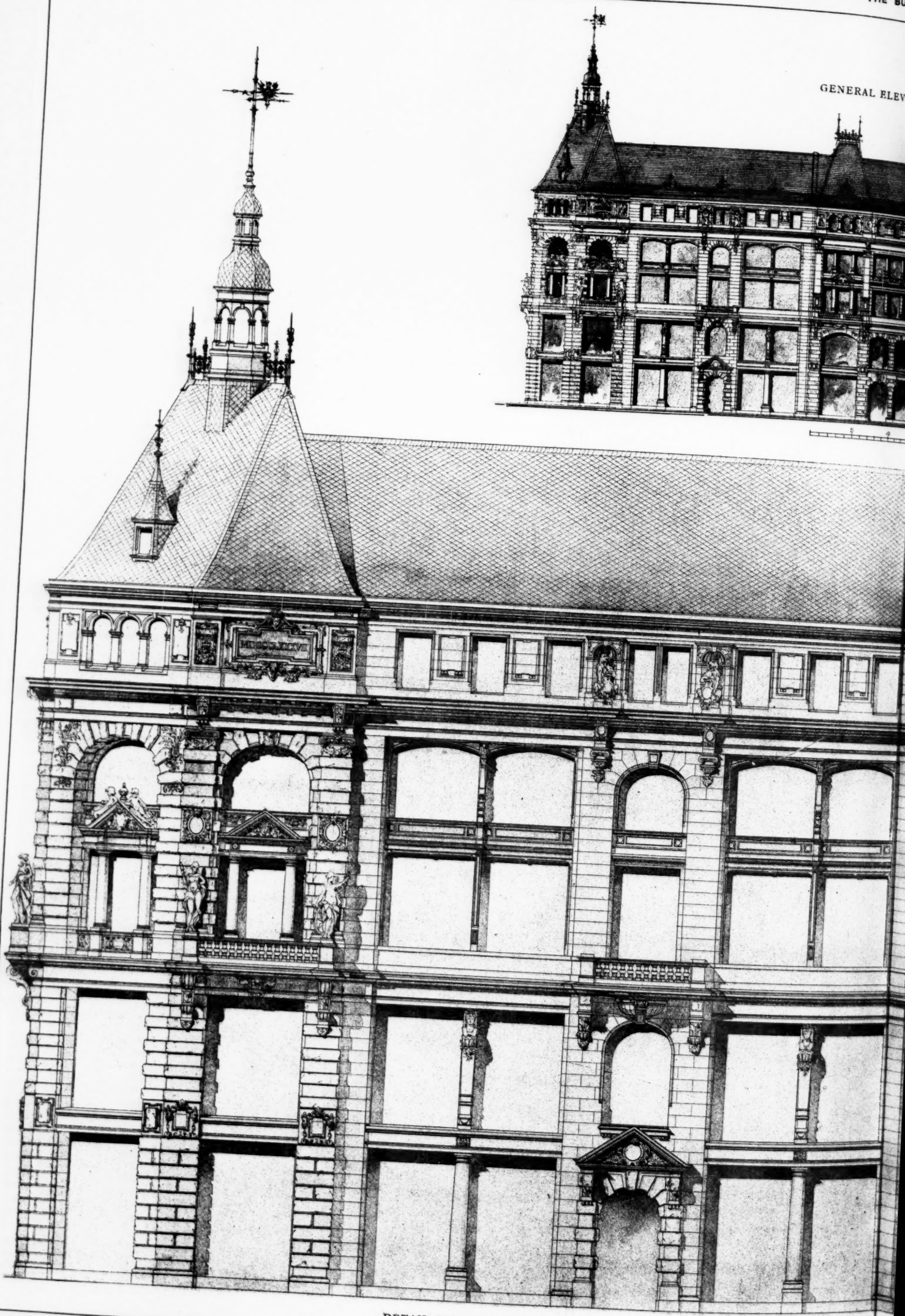

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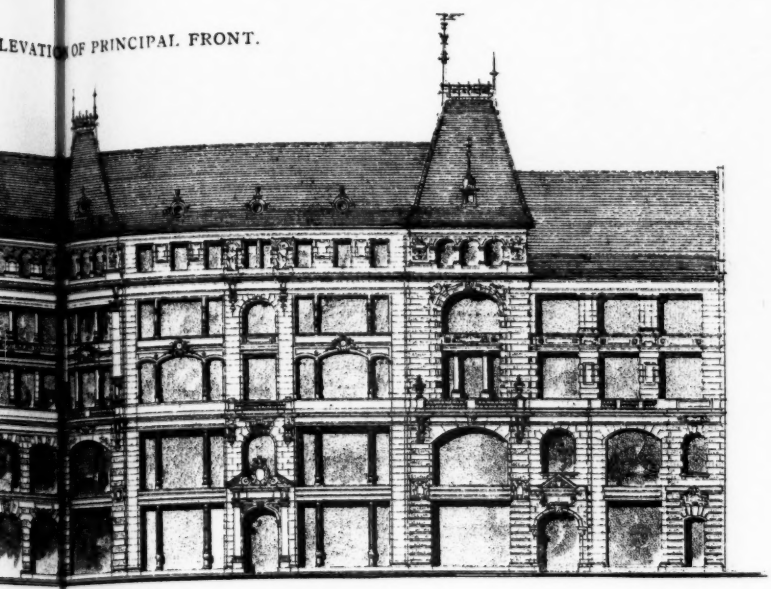

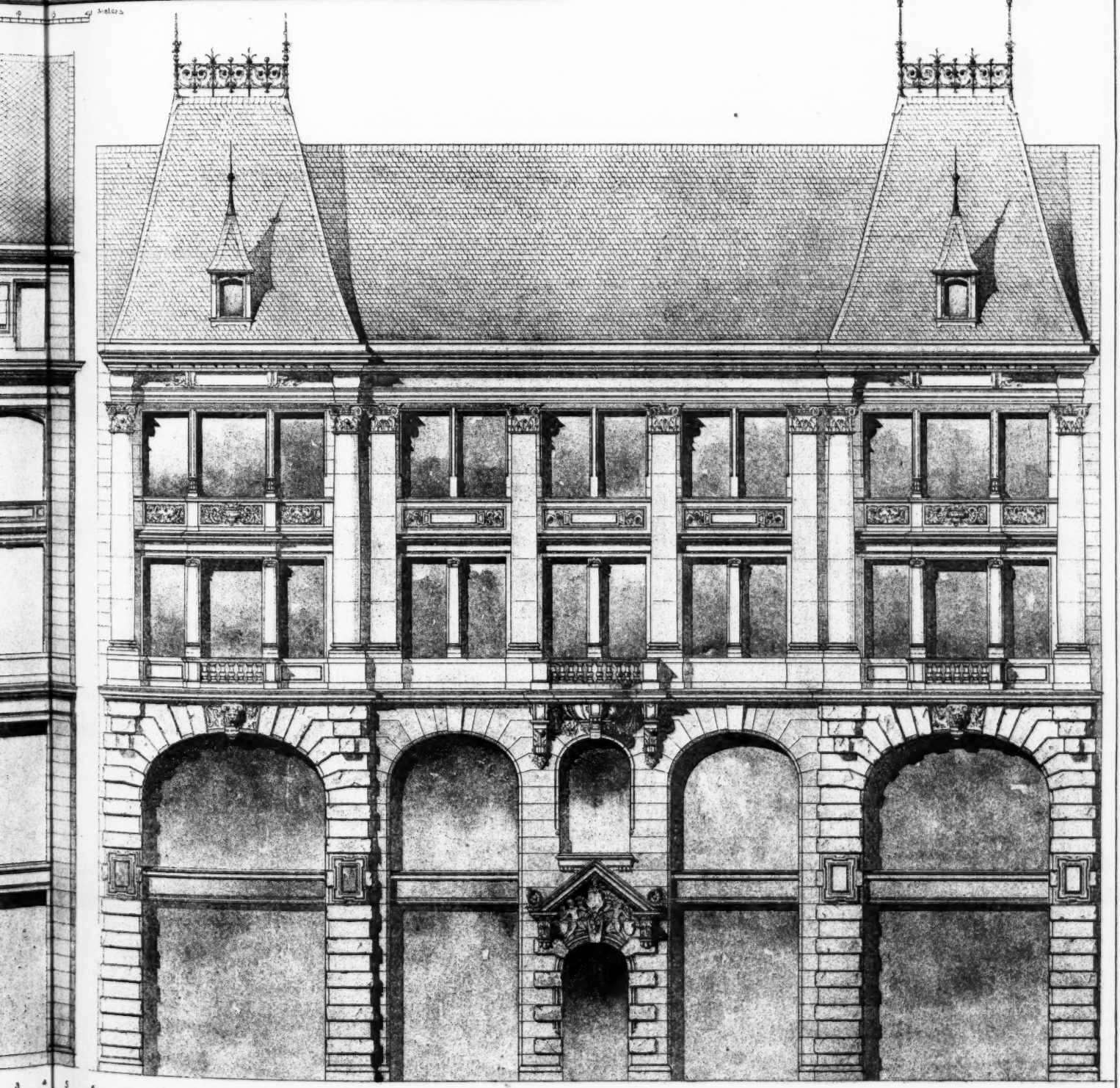

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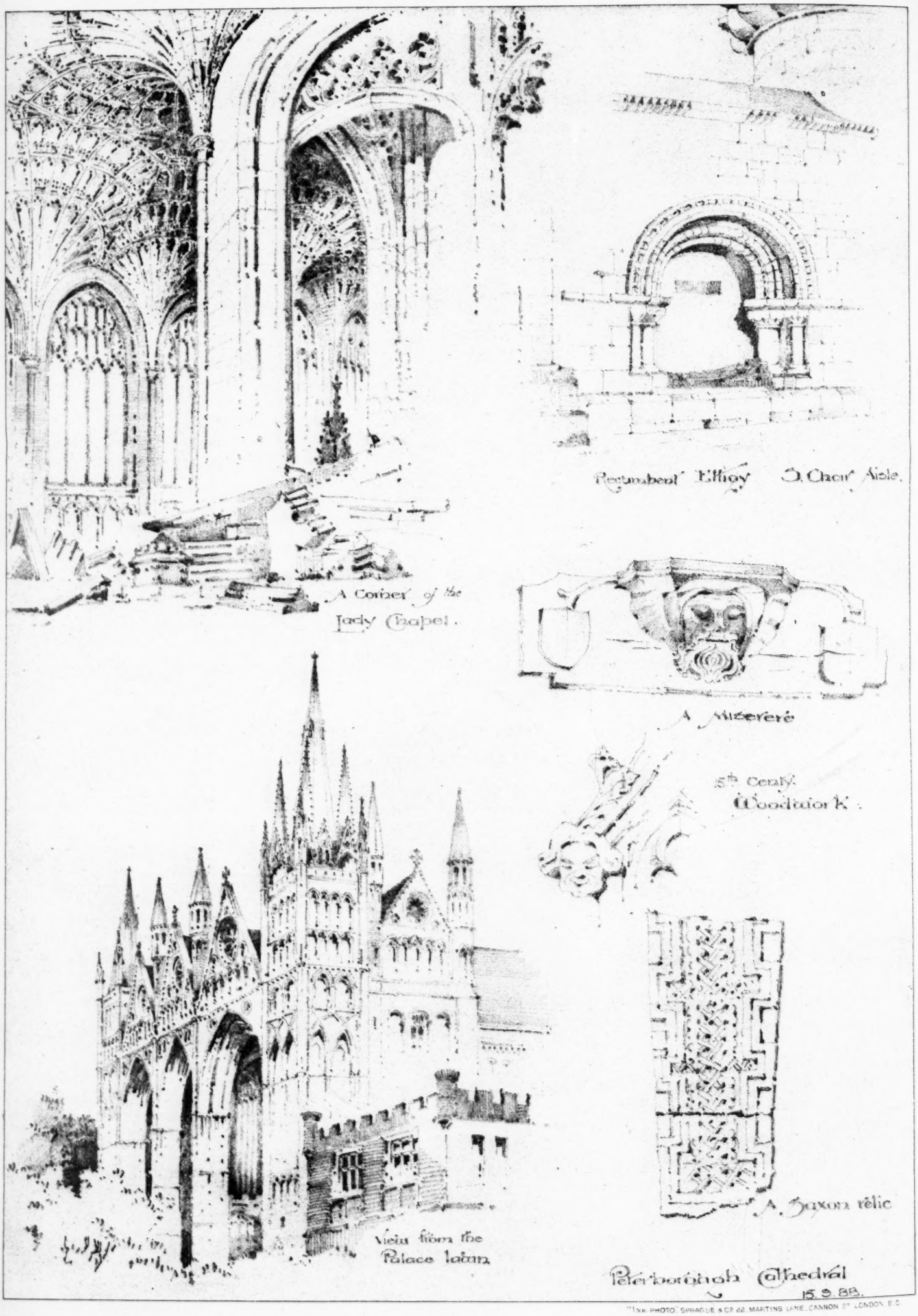

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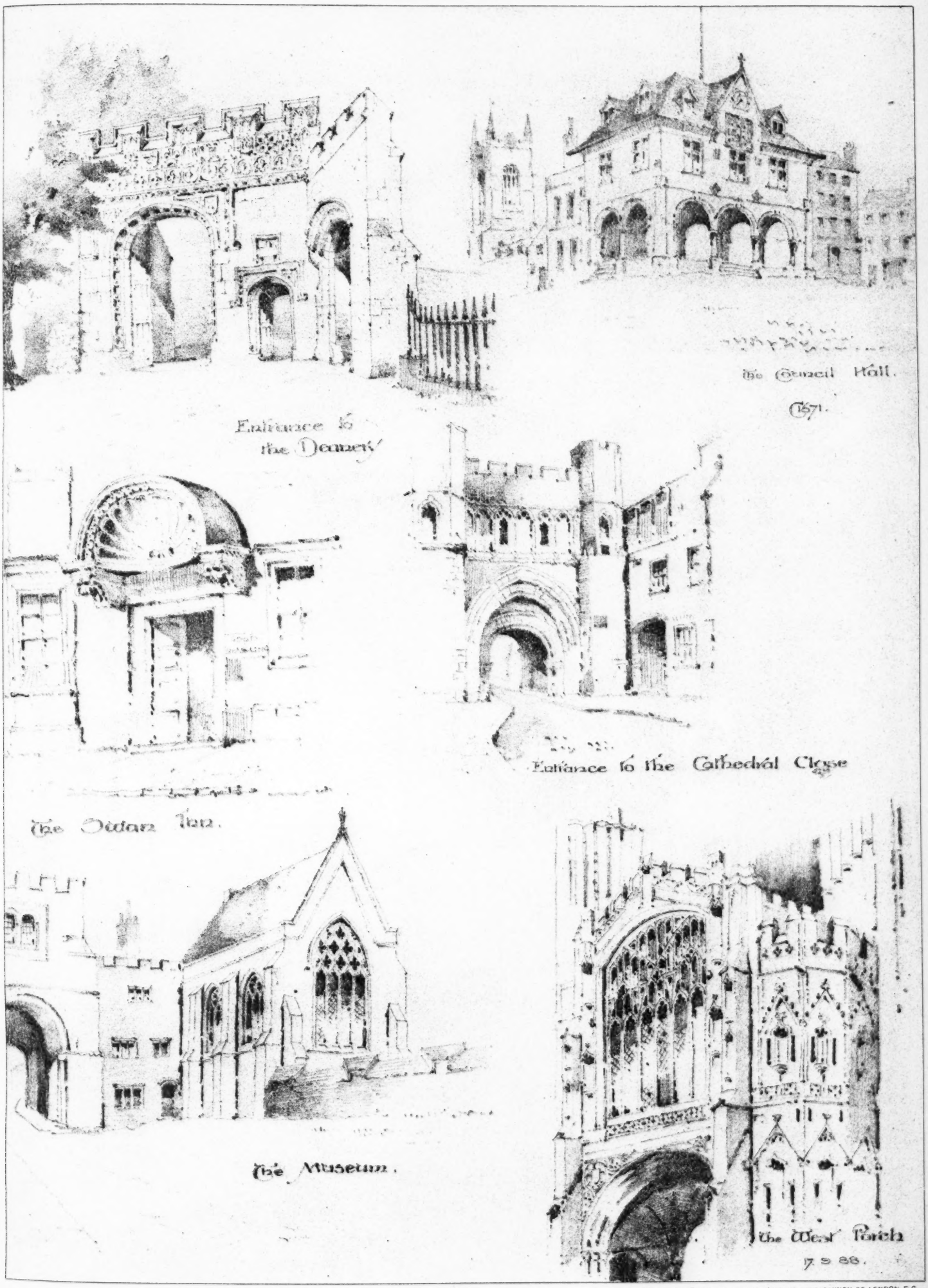

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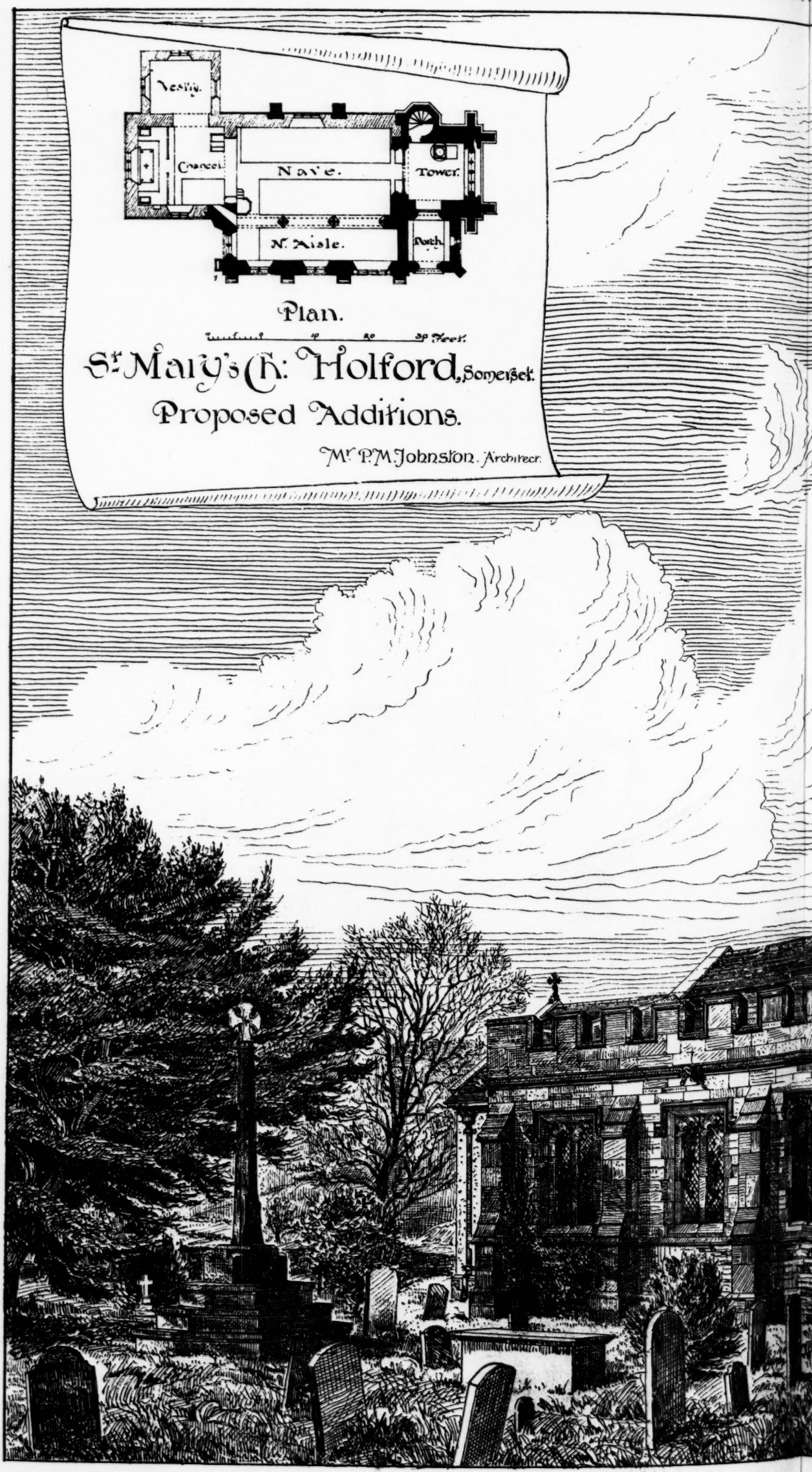
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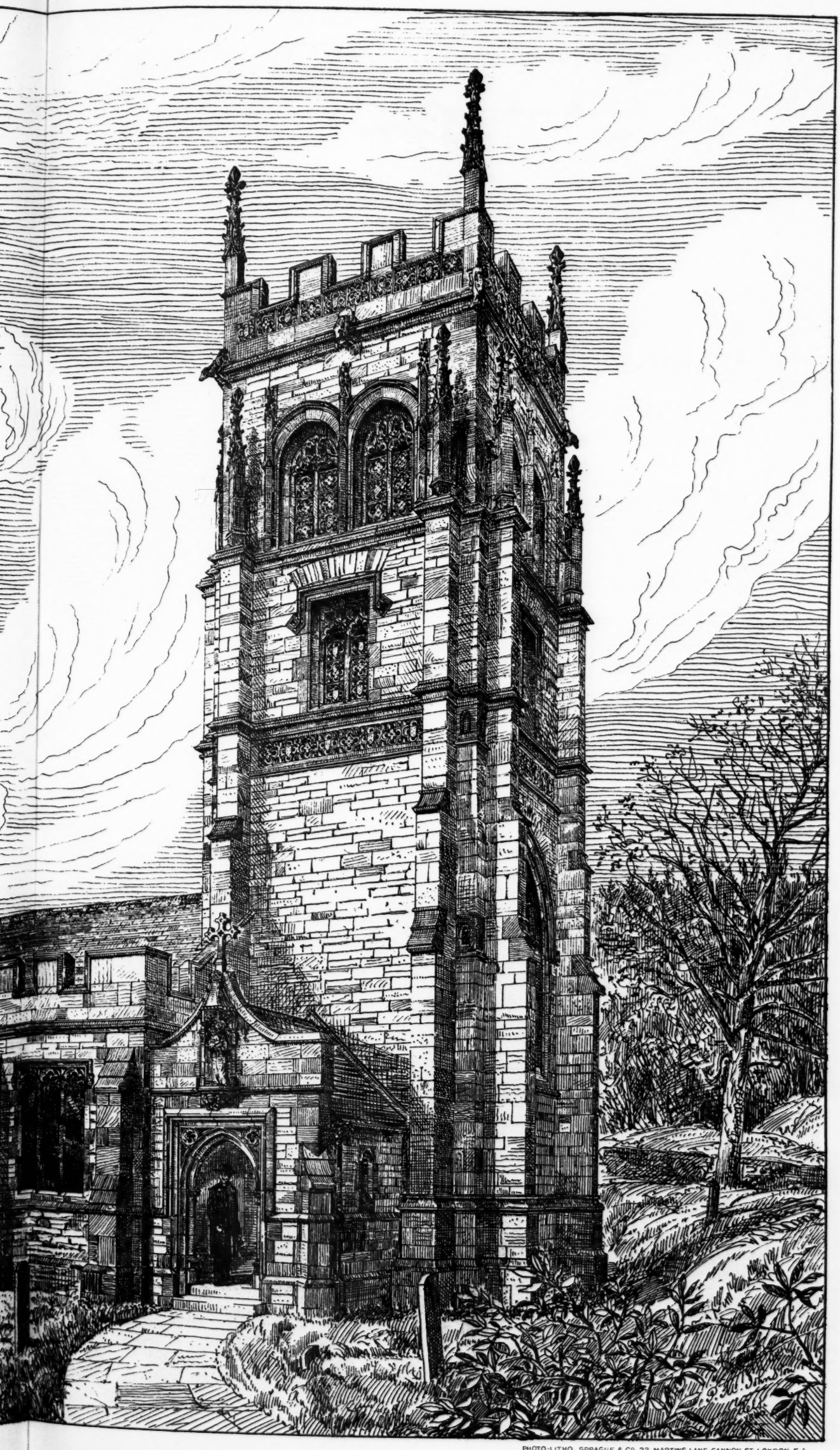

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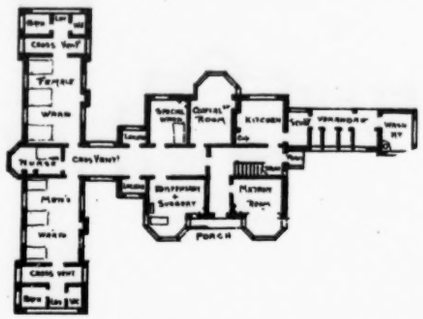

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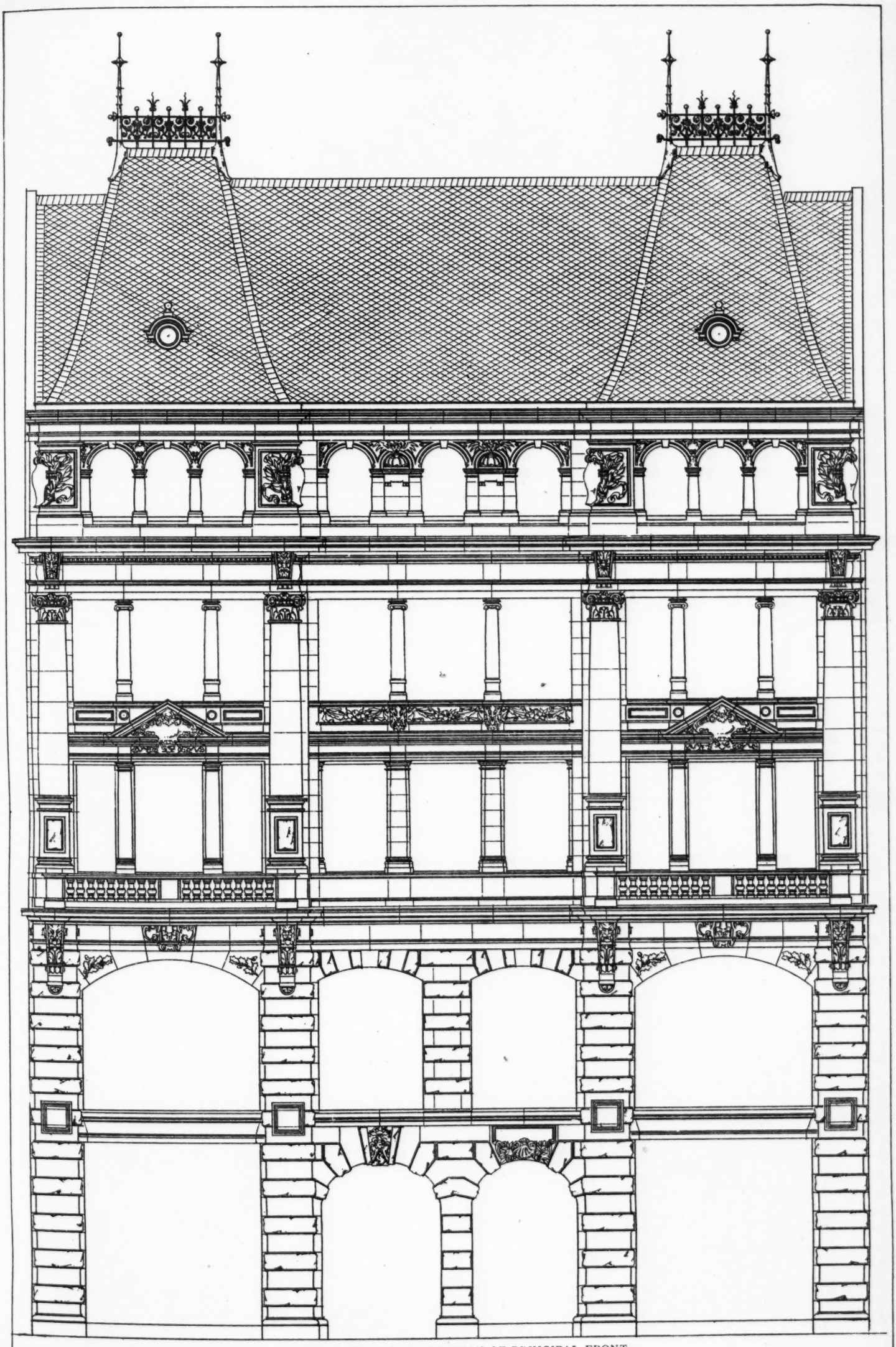
COTTAGE HOSPITAL, STANMORE.—Mr. John F. Curwen, Architect.



DETAIL OF CENTRE PORTION OF PRINCIPAL FRONT.

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BERLIN STREET ARCHITECTURE: THE WERDER-HAUS BUILDINGS.—Herr Alfred Messel, Architect.